G. R. S. 58]

Previous references.

1902-03.

~~191~~ .

(Sanitary)

File No. 13/0203

Serial Nos. 1 to 4

Later references.

I

GENERAL AND REVENUE SECRETARIAT.

P. 72
E

Serial Nos.

Part B for

SUBJECT.

Utility of Disinfection by Desiccation

Sl. From The J. A. Resident.

No. 2058/P dated 27/10/02

Forwards Copy of plague Returns of Jammu city and districts Showing the effects of Desiccation of Dwellings and effects on death-rate with explanatory notes and observations by the Chief Medical officer of Jammu Province.

GPB—3,500—21-7-14

Commd

Sl 2. To The Senior Surgeon.

No 6914 Dy 5.11.02.

Forwards the Returns referred to in Sl 1 and requests to have the system experimented in Bangalore or Mysore.

Sl 3. From The Senior Surgeon

No 356 Dy 2.4.03.

Forwards a Report on the value of Disinfection of houses by fire and requests to authorize the Senior Surgeon to sanction such sums as may be required for the purpose.

Sl 4. To The Senior Surgeon, Comptroller.

No 15251-2 Dy 22.4.03.

States that the Senior Surgeon is authorized to incur such small expenditure as may be necessary and that the system may be continued for a further period of 6 months.

Indexed.

OFFICE OF THE
DEWAN OF MYSORE
Regd No 4635
31 OCT. 1902

Lab p 1036

1901-2

From

THE FIRST ASSISTANT TO THE
13.01.02 HON'BLE THE RESIDENT
IN MYSORE.

To Pol. 694

THE DEWAN OF MYSORE.

Dated 27. 10. 02

Despatched

Received

General No. 2058 P
No.

Enclosure No.

3/11

Forwdg copy of Plague Returns of Jammu city and tribects from 1st December 1901 to 3rd May 1902, showing the effects of Desiccation of Dwellings and effects on death-rate with explanatory notes and observations by B. R. Sawhney MB Chief Medical Officer, Jammu Province, Kashmir State.

References to be marked.

Seal

Rect at 12 noon
31.10.1902
Repd on 1.11.1902

Submitted
For Dewan's orders
Hon'ble Resident's observations
See within
Yes
1/11/02

MGCPB—2,000—30-7-01.

No. 2058 D

Encl

Read 27/10/02

6867
R 27-X-02.

THE RESIDENT'S OFFICE,

Dated Bangalore 27th October *1902.*

Copy forwarded to the Dewan of Mysore, Bangalore

for information ~~and favour of~~

I.S.C.

First Assistant Resident.

For Secretariat
Branch
Original letter
is carefully
examined in Mysore as
Mysore letter
received-wanted
reported

28.X.02

29/10

3

This seems to be a method worth trying if fuller details of the Patent machine & of the best method of this pre-drying are obtained.

27/10

No. 4494, dated Srinagar, the 18th June 1902.

From—L. W. DANE, Esq., I.C.S., Resident in Kashmir,

To—The Secretary to the Government of India in the Foreign Department.

Referring to your letter No. 1784-I. A., dated the 3rd May last, on the plague measures in Jammu, I have the honour to submit, for the information of the Government of India, a report by Dr. B. R. Sawhney, Chief Medical Officer, Jammu, on the results of desiccation in the Jammu City and Province, with the remarks of Lieutenant-Colonel Duke, I.M.S., Superintending Surgeon, thereon, and three copies of a printed pamphlet by Dr. Sawhney on desiccation.

2. An examination of the chart attached to the printed pamphlet and of the figures in Statement I-*A* will show that the fall in the death-rate was remarkably rapid after desiccation was started, though there was no such marked fall in Sialkot City 27 miles off, or in the Punjab generally, until much later in the year. In Jammu City the disease was stamped out by the beginning of May, and on the 14th June the town was declared free of plague, no case having occurred for 30 days.

3. The question, of course, arises, would the disease have died out in the same way owing to the advent of the hot weather without desiccation? I am inclined to think it would not. It was increasing rapidly up to the time when desiccation was started, and the weather for three weeks after 15th March was much cooler than before that date and so more favourable for the spread of the disease. Yet the disease went down rapidly, though the population was rapidly increasing by the daily return of the refugees. The people at least were convinced that desiccation was stopping the plague, as they began to come back when they heard the results, and insisted on their houses being desiccated. I have heard of one case in which three birds and eleven lizards died in a house during desiccation, which shows the great heat generated.

4. At any rate, we have acquired a means of disinfection which the people approve and thoroughly believe to be effective; which is a great point gained, and, if the disease unfortunately breaks out again in the autumn, we shall not have a repetition of the dangerous panic of last winter, and can test the value of desiccation fully.

I may add that in the desiccators we used the anthracite coal from Ladda, 37 miles from Jammu, which gave far better results than any other fuel, as it generated a fierce heat without smoke or smell.

The figures for desiccation with or without evacuation in the villages are very interesting, and there is no doubt that we have stopped the disease more rapidly in Jammu than in the adjoining tract of Sialkot where the mortality is still high.

5. On the whole, therefore, I believe that, though not absolutely conclusive, our experience of the advantages of desiccation goes far to prove that it is efficacious in stamping out the plague, that it commends itself to the people, that it is cheap and easily applied and is everywhere available, that it requires less skilled supervision than chemical disinfection, and that the house immediately after disinfection can be re-occupied so no lengthy evacuation is necessary, and, finally, that the clothing and other effects can be disinfected without removal.

6. Finally, I would bring the services rendered by Dr. B. R. Sawhney and Assistant Surgeon Duni Chand prominently to the notice of the Government of India. These gentlemen worked under most discouraging conditions and with at first but half-hearted support from the authorities. Everything was ripe for a riot early in March, and I have no hesitation in saying that both they and Lieutenant-Colonel Duke ran serious personal risk in carrying out their sanitary measures. In addition to the case quoted in paragraph 4 of my letter No. 1565, dated the 3rd March last, I may mention that a Post Office Inspector, being mistaken for a plague official, was severely beaten near Jammu. We also had considerable difficulty in convincing the Darbar of the

vital necessity for commencing and continuing the work, though as soon as they saw the beneficial results they loyally co-operated and everything ended well.

No. 170-59, dated the 4th June 1902.

From—The Superintending Surgeon, Jammu and Kashmir State Hospitals, Srinagar,

To—The Resident in Kashmir.

In accordance with your No. 3160 of 1902, I submit a report drawn up by the Chief Medical Officer, Jammu, showing the effects of desiccation on the total death-rate in the city of Jammu, with explanatory notes and observations.

Attached to this report are tables showing :—

I-*A*. Weekly death-rate in Jammu as affected by desiccation from 7th December 1901 to 10th May 1902.

I-*B*. The death-rate in Sialkot, 1st December 1901 to 10th May 1902.

II. General disinfection in 58 villages, no other preventive measures adopted, 7th December to 3rd May.

III. Preventive. Desiccation without evacuation (very successful), 7th December 1901 to 3rd May 1902.

IV. (Evacuation.) Desiccation, 7th December to 3rd May 1902.

In my note, submitted on February 26th ultimo, your special attention was drawn to the value of open desiccation which was first carried out under my order in villages in February 1902.

Since then, March 1902, Dr. Bhagat Ram Sawhney has invented and patented a desiccator, the use of which has materially helped to free Jammu from plague.

The report, under consideration, proves the value of dry heat, maintained for 30 minutes at a temperature of 160° Fah. in destroying the plague microbe in the city of Jammu.

2. The report further shows that, on the return of 27,000 inhabitants to the city, none contracted plague, with a few exceptions, amongst those who arrived from actually infected outside villages.

3. As pointed out, the chief advantage of disinfection by fire is that the heat devolved reaches *all parts* of the dwelling, floor, walls, roofs, recesses. The upper roof heat developed is 40 degrees higher than the ground heat. In this way, rats and mice are destroyed, or leave the dwelling, and probably fleas, bugs (recognized carriers of plague), are also destroyed.

4. Dr. Sawhney's desiccator appears to be free from dangers, no fires or accidents having occurred.

5. Desiccation is, I consider, the most valuable method of disinfection we possess. It is eminently suitable to the mud flat-roofed houses of the Punjab.

The value of this report would be increased, if the preventive methods adopted in the neighbouring city of Sialkot and the death-rate up to May 31st were called for.

In conclusion, I would bring to your notice the excellence of the work, performed by Dr. Bhagat Ram Sawhney, M.B., Chief Medical Officer, and Assistant Surgeon Duni Chand, Health Officer in the city of Jammu, after my departure for Kashmir on March 16th.

PLAGUE RETURNS

OF

JAMMU CITY AND DISTRICTS

FROM 1ST DECEMBER 1901 TO 3RD MAY 1902

SHOWING THE EFFECTS OF DESICCATION OF DWELLINGS AND EFFECTS ON DEATH-RATE

WITH

EXPLANATORY NOTES AND OBSERVATIONS

BY

B. R. SAWHNEY, M.B.,

CHIEF MEDICAL OFFICER, JAMMU PROVINCE, KASHMIR STATE.

DESICCATION OF JAMMU CITY.

[Population = 37,000; Houses = 8,464.]

Plague broke out in the town of Jammu about the end of December 1901, and the desiccation was taken in hand on 10th March 1902.

2. *Desiccating establishment divided into gangs.*—The desiccating establishment, which consisted of—

1 Hospital Assistant, 5 Desiccating Inspectors,	64 Desiccator attendants, and 50 Coolies (for open fire desication),

was, at the suggestion of the Resident in Kashmir, Mr. Louis W. Dane, C.S., divided into two gangs, *viz.*, (*a*) special, and (*b*) general.

(*a*) SPECIAL GANG.—The operations of this gang were restricted to the actual houses in which either plague cases had occurred or dead rats had been found; and such houses were almost always desiccated by means of "Sawhney's Desiccators," in order to ensure a thorough disinfection of both the dwellings and the effects. Following more or less closely in the wake of the disease, this special desiccation, I believe, greatly helped in limiting its further spread.

(*b*) GENERAL GANG.—This gang undertook general and systematic desiccation of the whole town, tackling it by mohallas or streets; each street was done from end to end, house by house, and room by room. Houses and shops that were found locked, and of which the owners were at the time not present in Jammu, were, for the time being, let alone. Most of these have since been desiccated and the very few that still remain are being done as the owners are returning.

During general desiccation, the infected houses were again done by means of desiccators; the uninfected ones by open heap fires lighted on the floors.

Five hundred and forty-six houses by special and 7,899 by general desiccation have been done up to date.

3. *Desiccating Inspectors to register temperature and to note time of each desiccation.*—Each Desiccating Inspector was provided with a watch and a couple of sun thermometers with which to note time and to test the temperature of the rooms. Due care was taken to raise the floor temperature to 130° F. (with this the wall temperature rises to nearly 180° F.) at the very least, and to maintain it at that level for not less than 30 minutes in each case. This standard has, however, quite recently been raised to 158° F. in the case of floors.

4. *Hours of desiccation.*—The hours of desiccation were fixed from 7 to 11 in the mornings, and 1 to 5 in the evenings as calculated to cause the least inconvenience to the inhabitants.

5. *Number of houses desiccated daily.*—When desiccation was in full swing, from 150 to 200 houses or 300 to 400 rooms were done daily.

6. *Arrangements of clothes, etc., during desiccation.*—Where open heap fires were used, the household effects were removed from the room, and placed in the yard, but where desiccators were employed, the clothes were so arranged and hung on ropes inside the rooms, as allowed the hot air a free play over all parts of them; particular care being taken to open up all bundles. No particular trouble was taken with any brand-new clothes in locked up boxes, beyond throwing open the lid to admit hot air into the interior of the box; nor with other household effects which were left in the room almost undisturbed. The desiccator causes no damage whatever to clothes coloured or otherwise.

Old quilts (or khinds as they are called in these parts), blackened with dirt, and tattered from long and continued use, which in many cases constitute the sole family beddings of the poor, obviously offer great shelter to plague germs, and consequently serve as hot beds of infection. These, as well

as the body linen of patients, we always took particular care to obtain, pay for, and burn on the spot.

For one not intimately acquainted with the mode of living of the low class Indian poor, such as Meghs, Dooms, Chumars, sweepers and others, it is difficult to form an adequate estimate of the filthness of their home surroundings, and a study of the habits, etc., of these people alone can explain why they should be the chief victims of acute microbic diseases, as is undoubtedly the case.

7. *Town drains not considered worth troubling about.*—No attempts whatever were made to disinfect town drain, cesspits, etc., nor public or private latrines, as this was considered altogether uncalled for.

8. *Desiccation the only measure adopted to control the outbreak.*—When an alarming increase took place in the death-rate, and rats began dying in all quarters of the town, it is believed that about 29,000 people left the city. Isolation of patients and segregation of contacts was not effected except in the case of very few, who either had no friends to look after them or went to the segregation camp of their own free will. Desiccation was therefore the only measure officially adopted to check the spread of the disease. We have thus had a very good opportunity of judging its efficacy, which Table I-*A* clearly shows.

As desiccation progressed, deaths steadily lessened in number, until in a short period of seven weeks the death-rate fell down from 20 to 2 a day.

9. *No recrudescence but reinfections.*—The subjoined table gives the number of fresh cases that have occurred in desiccated rooms and the explanations of these occurrences.

Statement showing the number of plague cases that occurred in desiccated houses subsequent to desiccation and the explanations of these occurrences.

No. of cases.	Explanations.
5	Probably simultaneous infections; cases having occurred within ten days of desiccation.—[Microbe probably present in these cases at time of desiccation.—J. DUKE.]
40	Persons that contracted the disease ten days or more after desiccation from *living cases* either in the same houses or in adjoining ones.—[Contacts, people refusing to leave their houses.—J. DUKE.]
19	Infection brought from outside.
7	Sources of infection not clearly traced.

Thus, of the 71 persons who developed the disease after desiccation, five did so within ten days, the period usually allowed for incubation. These probably were cases of simultaneous infection. Forty contracted the disease ten or more days after desiccation of the house, from cases living either in the same rooms as the persons attacked or the adjoining ones.

Contacts.

These may therefore be considered as instances of communication of the disease from person to person by direct contagion.

In 19, the infection was brought from outside either from infected villages in the State territory or from infected places outside it.

In 7 cases the occurrence of infection after desiccation in previously uninfected rooms could not be satisfactorily accounted for. A genuine recrudescence of the infection in a desiccated room has not, so far, occurred within my knowledge.

Reinfected houses have been desiccated a second, and sometimes even a third, time.

10. *No re-infection by agency of rats.*—No instances have occurred, so far, where a room thoroughly desiccated has become re-infected by the agency of rats; for these rodents invariably leave the place on desiccation, and are known not to return to it for weeks, even months afterwards. Houses have, however, become re-infected through diseased persons.

11. *Plague stamped out by desiccation.*—In the case of Jammu City, in which desiccation has been carried out under my direct supervision and that of the Health Officer, and the localities desiccated have been closely watched by us, it is a very fair conclusion that, the infection has been suppressed and finally completely destroyed by the desiccation operations alone, since indigenous cases have ceased to occur in the town.

12. *No death among desiccating establishment.*—It is satisfactory to note that, throughout the operations, no cases or deaths have occurred among the establishment employed on desiccation work, with the exception of one coolie, who, however, took the disease from his plague-stricken sister living with him at the time.

All were inoculated?—J. Duke.

13. *No accidents from fire.*—It is again satisfactory to mention that, in the course of desiccating a fairly big town like Jammu, no accidents from fire occurred excepting a minor one, for which the men in charge of the building (State) were more to blame than the disinfectors. This accident occurred after desiccation by open heap fires.

14. *General desiccation observed to render plague mild.*—It has frequently been brought to my notice by plague officials, and my own casual observation also leads me to think, that in cases of infection occurring after general desiccation of a locality, whether that infection has resulted from living cases or concealed infected clothing, or otherwise, the disease is generally of a milder type. In some cases fever is moderate, in some slight and in others entirely wanting, buboes being the chief sign of the disease in these cases. This point, however, needs further clinical observation, for, if this casual observation turn out to be correct, then desiccation also helps in reducing a very virulent and fatal infectious disease to a form of a more or less simple adenitis and robs plague of its present virulence and dread.

15. *New-comers not particularly liable to contract the disease.*—There is another fact worth recording that, of the 27,000 people who have by this date returned to the city after two to five months' absence from it, none has contracted plague except a very few returned from actually infected towns or villages.

16. *Exposed to fresh currents of air, plague patients cease to be infective.*—Since the commencement of desiccation, a number of concealed cases have been discovered in different parts of the town, and it is remarkable to note that these patients, freely going about with discharging buboes on, do not appear to transmit the disease to others, probably in consequence of their being freely exposed to open air.

This observation corroborates what I said last year in my pamphlet on the outbreak of plague in Jammu Province, 1901, that patients freely exposed to currents of air, especially in the open, cease to be infective.

This fact has also been repeatedly observed at the segregation camps.

17. *Desiccation more efficacious than chemical disinfection in the case of dwellings.*—In desiccation, or disinfection by fire, unlike chemical disinfection, all parts of the dwellings are reached, *viz.*, floors, walls, ceilings, roofs and all recesses and places which might have served for the reception of infected clothing.

This is the main feature of desiccation by dry heat 160° F.—J. Duke.

Any infective material that may have been deposited by rats in the roofs is also bound to be destroyed, as the heat is most intense in the uppermost parts of the rooms.

As much as 40°.—J. Duke.

18. *Natives of India have no prejudice against desiccation.*—A plague-stricken rat in a mouse-trap, placed by me inside a room under desiccation,

died in less than 10 minutes. Rats have been found dead in the rooms after desiccation, and have also been known to fall from the roof on the floor while desiccation was proceeding.

19. The attitude of the people was very hostile during January and February 1902, but in the beginning of March, when Colonel Duke, I.M.S., gave to the inhabitants a few demonstrations on the desiccators at work at a thoroughfare, misgivings and doubts in their minds were slowly removed.

They soon afterwards began to co-operate with the plague officials and became quite keen on desiccation.

20. *Desiccation brought down death-rate from 20 to 2 a day in eight weeks, see Table I.*—Since the first notes on desiccation, dated 23rd April 1902 (three copies annexed), exhibiting by graphic method the results of the process in Jammu City up to 21st April, were written, only seven imported and eight indigenous cases have been returned in the city; while during the last 14 days not a single case either local or imported has occurred.

Plague has now quite ceased in the city since 14th May, practically since 5th May.—J. DUKE.

The average daily death-rate during the past 35 days has, moreover, not exceeded 1·85 on a population of 35,000 souls.

DESICCATION IN THE DISTRICTS.

21. *No records kept of desiccations carried out by villagers of their own accord.*—As a result of the teachings and demonstrations during the first epidemic, the villagers carried out desiccations sometimes singly, sometimes collectively, in a large number of the infected villages during the course of the outbreaks.

These desiccations, which the people performed without being asked by officials, are not shown in the village tables as no records have been kept of them.

Official desiccation.—Desiccations exhibited in the tables are only those that were undertaken by the villagers under express official advice and performed under official supervision. These, therefore, do not give any exact idea of the extent of desiccation carried out in the villages mentioned in the tables, but indicate, in a more or less general way, the good effects of this process on the death-rate of plague; and the popularity of this mode of disinfection with the rural population.

22. *Desiccation liked, because simple, entailing no exposure and least inconvenience.*—Evacuation, more or less complete, was resorted to by the people in only 21 villages; in all the rest mentioned in the tables, desiccation was the only measure employed to control the outbreaks.

23. *Change of type in the disease after desiccation noticed in villages also.*—After general desiccation of a village, the percentage of recoveries among those that are actually sick at the time of desiccation or are incubating the disease, has been noted to be much larger than before desiccation.

24. *No recrudescence after desiccation in villages.*—In the 21 villages where people evacuated and desiccated their houses before re-occupation, no cases occurred subsequent to re-occupation. On the other hand, in a few instances, where the occupants of infected dwellings evacuated and remained in camp for a fortnight or three weeks after the entire cessation of fresh cases amongst them, but only neglected to desiccate their houses before re-entry, the disease broke out afresh, indicating that the germs left undisturbed inside locked rooms were alive and active even after a lapse of weeks.

25. *Death among cats, dogs and fowls in plague-infected villages.*—Like rats, cats, dogs and domestic fowls have also been observed to die in unusually large numbers in some of the infected villages.

These deaths were looked upon as due to plague and the houses desiccated as if rats had died.

B. R. SAWHNEY, *M.B., B.S. (Durh.)*,
Chief Medical Officer, Jammu Province.

JAMMU;
The 26th May 1902.

Notes on desiccation of plague-infected dwellings and effects in the Jammu District and City, Kashmir State, during 1901-02, by Dr. B. R. SAWHNEY, M.B., B.S. (Durham), M.R.C.S. (England), L.R.C.P. (London), and L.M. & S. (Punjab), Chief Medical Officer, Jammu Province.

In July 1900, cholera broke out in the Jammu Province. From the Jammu City, which also became affected, the disease spread to the local Central Jail on August 3rd, 1900. At the time of this outbreak, the atmosphere, owing to excessive rains here that summer, was very close and full of moisture. This mugginess of the atmosphere was most perceptible inside rooms not properly ventilated.

2. In the jail outbreak it was observed that, while cases occurred in every sleeping barrack and in the Workshops, none of the prisoners employed in the jail kitchen, where food is cooked daily for over 300 prisoners, took the disease. These prisoners slept at night in a room adjoining the kitchen. It was further observed that, as a rule, fresh cases occurred more on the days following rainy nights when the prisoners were obliged to sleep inside the barracks, instead of in the yards, for want of sufficient verandah accommodation, than on other days.

3. Besides employing all ordinary measures calculated to check the spread of cholera, I caused sky-lights and holes to be made in the roofs and walls of the rooms of which the ventilation seemed most defective; and fires to be lighted daily for a couple of hours in all sleeping barracks, in order to set up currents of air and to take away dampness. We were successful in stamping out the infection from the jail in 19 days, during which period 41 cases and 19 deaths occurred.

4. This outbreak of cholera in the Jammu Central Jail, where we could easily study everything that seemed to have any appreciable effect on the progress of the disease, left on my mind a strong impression of the value of perflation and desiccation as suppressive measures well worth trial in other infectious diseases also.

5. About this time cases of cholera were still occurring in some parts of the town, which give us opportunities of testing further the value of perflation and desiccation in cholera-infection, and here also the results were all that could be desired.

6. Thus favourably impressed with the good effects of letting in air and sunlight in cholera-infected rooms and in heating them by fire, I resolved upon giving these methods of disinfection of dwellings a trial in dealing with the infection of plague, in case that scourge found its way into the territories of His Highness the Maharaja of Kashmir. While thinking over the subject of desiccation by fire, such facts as the disappearance of Great Plague of London by fire; the desiccation to death of animals in the Great Sahara of Africa when deprived of water for any length of time; the drying up of all juicy fruits in summer if left on the dining table for several days, and above all the natural termination of outbursts of plague with the excessive summer heat of the tropics, etc., etc., also crossed my mind.

7. As apprehended, it was not long before we were actually brought face to face with plague, which extended into the State territory in February 1901, from the adjoining infected district of Gurdaspur.

THE FIRST EPIDEMIC OF PLAGUE IN JAMMU PROVINCE.

Rora was the first State village that became infected. This village was most promptly taken in hand by the Superintending Surgeon of Kashmir, Colonel J. Duke, I.M.S., who advised and obtained sanction of the State Council to the immediate burning of the infected and two contiguous houses, which drastic measure completely stamped out the disease in that village. The owners of course were liberally compensated for their loss.

8. The village that became infected next was Jhajwal. Here, under instructions from Colonel Duke, dry cowdung was, for the first time, employed in heating infected rooms. At first the whole floor was covered with dry cowdung cakes, but later on, in order to test the temperature of the different

parts of the room by means of a thermometer, cowdung was arranged in heaps varying in number according to the size of the room and fire set to these heaps simultaneously. Subsequently combinations of cowdung and firewood, and of firewood and charcoal were employed. To test the heat value of the different forms of fuel obtainable locally, experiments were made.

Village Jhajwal.

9. Here the first case of plague occurred on March 2nd, 1901. The whole village was compulsorily evacuated, and every house, whether infected or not, heated. No cases occurred in this village after its re-occupation on 14th April 1901. The village continues free up to date.

Town of Samba.

10. This town, population 2,618, became infected in the last week of March 1901. The inhabitants objected at first to evacuation and then determinedly opposed official interference of any kind. They, however, in the commencement of the outbreak, when we were permitted to visit the infected houses, had had sufficient opportunities of seeing how we heated the rooms and made holes in the roofs and walls of infected rooms.

When they took the management of the town in their own hands they carried out these measures under the supervision of their own *Punchait*, though it is difficult to believe that they did so, so well as we would have done for them. The outbreak lasted for two months; 193 cases and 151 deaths were reported.

The remaining 13 infected villages.

11. Between 10th April and 7th July 1901, 13 more villages became infected. In all these, desiccation was the form of disinfection employed for dwellings, chiefly by the people themselves under supervision of their own Lambardars, Zaildars and other respectable individuals. In many cases the inhabitants evacuated the villages and then heated the houses; but in others they only heated the houses and did not evacuate.

12. Recrudescence of plague in any of the above 16 villages did not take place at all, though re-infection of two of these villages has occurred lately from importation of infection from outside.

THE SECOND EPIDEMIC OF PLAGUE IN JAMMU PROVINCE.

13. On 21st August 1901, the Province became re-infected. The first village infected was *Chhanni*. Restriction of every kind on the movements of the people having been removed by order of the State Council, the disease soon spread far and wide, and in a short time the number of infected villages became too large to be effectively dealt with by official agency. About the end of December 1901, the city of Jammu, population 37,000, also became infected, adding much to our embarrassment.

In the instructions issued by Superintending Surgeon to the Executive Plague Officers, he says regarding desiccation of villages: "As desiccation is now believed in, and approved of, by the people generally, it should invariably be carried out. It really costs little. In every village, however, are certain poor people who grudge even the expenditure of cowdung. Such people should be helped. It is the duty of the Plague Superintendent to see that desiccation is properly carried out by the Naib-Tahsildars:—

(1) The infected house or houses should be desiccated with cowdung.

(2) The house adjoining the infected one on each side should always be desiccated.

(3) All houses in which rats have died should also be desiccated.

(4) Eventually every house in the village at one time.

(5) One hour is only required.

(6) All clothing and furniture should be desiccated.

(7) The State will make good damages. If each village is tackled at once the plague will never get the grip it does when let alone."

RESULTS OF DESICCATION IN 108 VILLAGES IN SRI RANBIR SINGHPURA TEHSIL.

14. Up to 20th April 1902, no less than 377 villages became infected, the tehsil of Sri Ranbir Singhpura in the Jammu District being the principal sufferer. The Plague Superintendent, Rai Sahib Bishen Dass, who supervised desiccation in 108 villages in this tehsil, reports on the results of desiccation in these villages under date 5th April 1902, as follows :—

"In Tehsil Ranbir Singhpura 108 villages have, in all, been desiccated up to date, all principally by dry cowdung. The results have been good in 98, fair in 3 and unsatisfactory in 7. Desiccation was performed under direct supervision of Naib Tehsildar Nabi Bakhsh and under my own general supervision. No difficulty arose in carrying out desiccation as people like this mode of disinfection of their dwellings, and willingly listen to, and readily co-operate with, the officials.

"(2) The villages in which desiccation was undertaken before the actual outbreak, but which were imminently threatened with an invasion of the disease, or in which dead or dying rats had been discovered, escaped human infection almost entirely. This was the case at Devipore, Koul, Sagra, etc., etc.

"(3) Disease began abating in villages in which dessication was taken in hand soon after the occurrence of human cases.

"(4) In a few villages desiccation appeared to fail at first sight. In these, on enquiries made, it was found that the process had not been properly carried out. Success was, however, obtained by repeating the operations, as in the cases of Badial Qazian and Gulabgarh.

"(5) Whenever the whole village was desiccated at one time, rats disappeared from the village in most instances, and have not so far been known to return.

"(6) General cleanliness of the houses and health of the inmates, has been noted to improve in generally desiccated villages."

REPORT ON THE EFFECTS OF DESICCATION IN VILLAGE BILASPORE, POPULATION 259, BY HOSPITAL ASSISTANT TEJA SINGH, PLACED ON SPECIAL DUTY IN THE VILLAGE.

15. "In this village rats commenced dying in certain houses on or about January 25th, 1902. All such houses were heated; desiccation following closely in the wake of rat infection.

"The first human case occurred on 8th February in a house in which no dead rats had been seen. The second one on 10th February in another house where rats had previously died. On the occurrence of these two human cases inhabitants were advised to evacuate forthwith and to desiccate the whole village at one time. Some turned out in *chhappars*, some in the yards, while others stuck to their houses. All, however, joined in general desiccation. The Zemindars in whose houses rats had died and who lived in the upper or eastern half of the village agreed to the general desiccation with perfect willingness, while the other caste people, such as Dooms and Meghs, in whose houses rats had, then, not died and who occupied the lower or western half of the village, did so, only with reluctance, saying that their houses were not infected because no rats had died.

"After this general desiccation, which was performed by the people at their own expense, no human cases occurred for 17 days, but solitary dead rats were still occasionally met with in some houses. On 28th February 1902, a third case of plague occurred, this time in the western half of the village where rats also soon after began dying in large numbers. In all 48 cases and

21 deaths occurred in this village, all in the western half, of which the inhabitants had not thoroughly desiccated their houses, but had just raised smoke for mere appearance sake. With the exception of the first two cases, the Zemindars remained perfectly free from the disease, and were thus amply repaid for the pains and trouble they had taken in lighting fires in their houses almost daily while the disease remained in the village.

The inhabitants of the western half, having learnt by their bitter experience, the wisdom of their friends in the upper half of the village in frequently desiccating their houses, to keep the curse of plague at bay, eventually resorted to it, with the result that the disease began to decline after 11th March and finally ceased on 20th idem."

"I am led to believe—

(1) That the escape of the eastern half of the village was due entirely to desiccation.

(2) That smoke from smouldering fires causes a general flight of rats from the place and their remaining away for some time.

(3) That the houses in which desiccation was thoroughly done, no human cases occurred, although in them rats had previously died."

This Hospital Assistant, who is himself a native of Bilaspore and the Zaildar of the Zail, to which this village belongs, succeeded by his personal influence in inoculating 662 people against plague, with M. Haffkine's serum, and with very satisfactory results.

Village Mangoli.

16. Again, Hospital Assistant Teja Singh reports:—

"In Mangoli two imported cases of plague, both of which proved fatal, occurred in two houses."

Both these houses and their contents, with two contiguous houses, were desiccated by the occupants themselves for three successive days, with the result that no indigenous cases occurred in the village.

Village Arnea.

[Population 2,680; cases 350; deaths 260.]

17. The inhabitants desiccated the whole village on 10th January 1902, entirely on their own initiative, as a result of previous teaching and demonstration. Fires were lighted simultaneously by a signal given by the beating of a drum.

Ten days after this first desiccation the number of cases and deaths began to diminish perceptibly.

The village was visited by me on 28th January, when the people reported to me the good effects of general desiccation, and I advised them to repeat it.

Second general desiccation was done on 1st February, and a third one the following day.

This village was declared on 18th November 1901. Up to the 10th January 1902 (first general desiccation day) there had been 280 cases and 201 deaths during a period of 53 days.

Between 10th and 20th January, there were 51 cases and 48 deaths. This must be considered as the period in which persons already infected were incubating the disease.

Between 20th January and 13th February, there were 24 cases and 23 deaths in 25 days.

On 20th February the village was declared free and continues so up to date.

GENERAL DESICCATION OF JAMMU CITY.

[Population 37,000; houses 6,760.]

18. Plague broke out in this city in the latter half of December 1901. As is the case almost everywhere in the beginning of an outbreak, the

15

inhabitants would not have it ,that plague existed in the town, and resented every effort made by the authorities concerned, to make them see the real state of affairs. Cases were deliberately concealed, especially from the Plague authorities, and all sorts of devices were practised to baffle official efforts directed to check the spread of the disease. An enormous increase soon occurred in total deaths as compared with the normal death-rate of the town, and rats began dying in nearly all quarters of the city, showing that plague had taken firm root. Soon after the condition of the town became really pitiable. Palaces were vacated, all public offices were removed outside the city, and over 16,000 of the inhabitants fled.

19. With death and disaster all around, those that were still left in the city saw for themselves that what was playing havoc among them was *real* Bubonic Plague, and that they had all the time been living in a fool's paradise.

With this, a change came over their feelings with regard to the motives of the authorities in the measures they were anxious to adopt to combat with the scourge.

20. The Resident in Kashmir, Mr. Louis W. Dane, C.S., perceiving that the time had arrived when the inhabitants would no longer offer any foolish resistence to official exertions, got the State authorities also to see the same, and with the Superintending Surgeon, Kashmir, Colonel Joshua Duke, I.M.S., explained to the Kashmir Darbar, the propriety of a general desiccation of the town, and a special thorough desiccation of all infected houses in every part of the city. Well timed and very sympathetic as this advice was, it was listened to, and adopted, by the Darbar.

21. At this time I mentioned to the Resident about my desiccator, which had just then been finished after having passed through several crude forms.

I also mentioned to him that I had for months past thought that, if we could only manage to extend desiccation to clothing and furniture, a great step shall have been taken in the direction of removing all sorts of misgivings from the minds of the ignorant and excited native public, and that such a course might stop plague riots and murders in future.

He very kindly asked to see it at work, and I took the apparatus over to the Residency and demonstrated its use.

Being himself pleased with the working of the machine, he asked Colonel Duke to come and see it, and subsequently introduced it to His Highness the Maharaja, and to General Raja Sir Amar Singh, K.C.S.I., the Vice-President of State Council, and Commander-in-Chief of Kashmir Army.

The same evening both the Resident and the Superintending Surgeon came over to the Jammu Civil Hospital where open heap cowdung fires, and the desiccator working with the recently discovered Jammu coal, had been arranged for their inspection in two separate rooms with thermometers in, to indicate temperature. They decided upon a trial of the desiccator in the city, and they and the Kashmir Darbar soon afterwards learnt with delight that the "Sawhney Patent Desiccators" were being eagerly sought after by the inhabitants, and that the introduction of the desiccator in the city had, as was anticipated, fully restored the confidence of the people in the City Doctors which had been for the time being completely and seemingly irrevocably lost. This was also now evident from the fact that the in-coming trains, which had for many weeks come in empty, were once more seen overcrowded with refugee inhabitants, some of whom, in their anxiety to re-occupy these houses before others, did not even scruple to tip the desiccator attendants on the quiet.

His Highness the Maharaja Sahib Bahadur and General Raja Sir Amar Singh, K.C.S.I., were both delighted to express their approval of the working and success of the desiccator in the city, and extended its application in the Palaces.

22. Plague broke out in Jammu City on 18th December 1901, and general desiccation was started on 10th March 1902. The chart prepared by the Health Officer, Major Duni Chand, shows at a glance the good effects of

desiccation on plague seizures and deaths in the city between 11th March and 21st April 1902. The death-rate has during this period of six weeks been brought down by desiccation from 15 a day on 8,000 to 3 a day on 30,000, while the rate has not fallen elsewhere.

B. R. SAWHNEY, *M.B.,B.S.* (*Durh.*),
Chief Medical Officer, Jammu Province.

JAMMU;
The 22nd April 1901.

MEMORANDUM.

The Civil Surgeon of Sialkot has not yet replied undersigned's letter requesting him to kindly furnish details of Sialkot City plague.

Figures given in Table I (*b*) have been obtained from his office during his absence on tour of inspection of dispensaries, to avoid further delay in the despatch of these returns.

B. R. SAWHNEY, *M.B.,B.S. (Durh.)*,
Chief Medical Officer, Jammu.

JAMMU;
The 29th May 1902.

TABLE I-*A*.—*Showing weekly deaths from all causes including deaths reported to have taken place from plague. The number of houses desiccated is also shown by weeks. The steady fall in the total death-rate of the town, with the progress of desiccation, is most conspicuous.*

Particulars.	Week ending 7th December 1901.	Week ending 14th December 1901.	Week ending 21st December 1901.	Week ending 28th December 1901.	Week ending 4th January 1902.	Week ending 11th January 1902.	Week ending 18th January 1902.	Week ending 25th January 1902.	Week ending 1st February 1902.	Week ending 8th February 1902.	Week ending 15th February 1902.	Week ending 22nd February 1902.	Week ending 1st March 1902.	Week ending 8th March 1902.	Week ending 15th March 1902.	Week ending 22nd March 1902.	Week ending 29th March 1902.	Week ending 5th April 1902.	Week ending 12th April 1902.	Week ending 19th April 1902.	Week ending 26th April 1902.	Week ending 3rd May 1902.	Week ending 10th May 1902.	Total.	Remarks.
Deaths . . .	13	15	20	13	31*	24	38	35	50	63	78	63	89	115	101†	85	60	56	34	27	22	15	16	1,063	* Jammu city officially declared infected, 4th January 1902. † Desiccation commenced 10th March 1902.
Houses desiccated .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100	454	902	1,160	997	848	1,182	1,166	586	7,395	
						City deserted practically 27,000 inhabitants but 36,000 having fled. The palaces and all public offices and schools were vacated.—J. Duke.													Inhabitants have mostly returned. —J. Duke.							

SIALKOT CITY.

[Population = 44,717.]

TABLE I-*B*.—*Weekly deaths from all causes, including deaths reported to have taken place from plague, from December 1st, 1901, to May 10th, 1902.*

—	Week ending 7th December 1901.	Week ending 14th December 1901.	Week ending 21st December 1901.	Week ending 28th December 1901.	Week ending 4th January 1902.	Week ending 11th January 1902.	Week ending 18th January 1902.	Week ending 25th January 1902.	Week ending 1st February 1902.	Week ending 8th February 1902.	Week ending 15th February 1902.	Week ending 22nd February 1902.	Week ending 1st March 1902.	Week ending 8th March 1902.	Week ending 15th March 1902.	Week ending 22nd March 1902.	Week ending 29th March 1902.	Week ending 5th April 1902.	Week ending 12th April 1902.	Week ending 19th April 1902.	Week ending 26th April 1902.	Week ending 3rd May 1902.	Week ending 10th May 1902.	Total.	Remarks.
—	54	58	60	32	87	65	87	69	66	117	93	66	85	55	91	92	83	86	69	40	89	56	38	1,638	It is not stated whether the inhabitants vacated the city, as in Jammu, nor the method of disinfection, if any, resorted to. J. Duke.

B. R. SAWHNEY,
Chief Medical Officer.

Jammu City:
The 22nd May 1902.

TABLE II.—*Weekly returns of deaths from plague in 58 villages in which measures, such as evacuation, isolation,*

Serial No.	Name of Villages.	Population.	Week ending 7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
1	Chak Fattoo	638	...	...	...	...	...	...	...	...	...	...
2	Kapurpur	121	...	...	...	...	...	...	...	...	...	...
3	Bhadyal Kazian	1,206	...	...	...	...	...	...	...	...	...	...
4	Sathrian Kalan	149	...	...	...	...	...	...	...	...	...	...
5	Gulabgarh	257	...	...	...	...	...	...	...	...	...	...
6	Drowta	682	...	...	...	...	...	...	...	...	...	...
7	Chak Talab	261	...	...	...	...	...	...	...	...	4	12
8	Kotli Shahdola	196	...	...	...	...	...	3	...	3	2	2
9	Suchetgarh	241	...	...	...	...	...	...	...	...	...	...
10	Ghazipur	241	...	...	...	...	...	...	...	...	...	12
11	Khipper	237	...	...	...	...	...	...	...	...	6	2
12	Satowali	461	...	...	...	...	...	...	...	...	2	12
13	Dohana	129	...	...	...	...	...	...	...	...	...	...
14	Tanda	140	...	...	...	...	...	...	...	...	...	...
15	Phillowra	363	...	...	...	...	...	...	...	...	...	...
16	Bagga Zena	361	...	...	...	...	...	...	...	...	...	...
17	Bhadyal Brahmanan	1,010	...	...	...	...	...	...	...	...	7	21
18	Fatehpur Brahmanan	342	...	...	...	...	...	...	...	...	...	...
19	Sangial	189	...	...	...	...	...	...	...	...	...	6
20	Kotli Arjan Singh	204	...	...	...	...	...	...	...	...	...	...
21	Bokri	226	...	...	...	...	...	...	...	...	...	...
22	Rattian	323	...	...	2	2	...	...	...	...	...	...
23	Chak Fakhtawan	233	...	...	...	...	...	...	...	...	...	...
24	Chak Muhammad Yar	409	...	...	...	...	...	...	...	2	...	5
25	Dopliar	644	...	...	...	...	3	...	...	...	1	...
26	Chak Bala	269	...	...	...	...	...	...	...	...	1	...
27	Bhalesar	182	...	...	...	...	...	...	...	...	...	...
28	Magowali	930	...	...	...	...	...	...	...	...	...	...

General desiccation only, no other preventive

TABLE II.—*Weekly returns of deaths from plague in 58 villages in which measures, such as evacuation, isolation,*

Serial No.	Name of Villages.	Population.	Week									
			7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
1	Chak Fattoo . .	638	...	...	...	...	...	...	...	...	...	...
2	Kapurpur . .	121	...	...	...	...	...	...	...	...	...	...
3	Bhadyal Kazian .	1,206	...	...	...	...	...	...	...	...	...	...
4	Sathrian Kalan .	149	...	...	...	...	...	...	...	...	...	...
5	Gulabgarh . .	257	...	...	...	...	...	...	...	...	...	...
6	Drowta . . .	682	...	...	...	...	...	...	...	...	...	...
7	Chak Talab . .	261	...	...	...	...	...	...	...	...	4	12
8	Kotli Shahdola . .	196	...	...	...	...	...	3	...	3	2	2
9	Suchetgarh . .	241	...	...	...	...	...	...	...	...	...	...
10	Ghazipur . . .	241	...	...	...	...	...	...	...	...	...	12
11	Khipper . . .	237	...	...	...	...	...	...	...	...	6	2
12	Satowali . . .	461	...	...	...	...	...	...	...	...	2	12
13	Dohana . . .	129	...	...	...	...	...	...	...	...	...	...
14	Tanda . . .	140	...	...	...	...	...	...	...	...	...	...
15	Phillowra . .	363	...	...	...	...	...	...	...	...	...	...
16	Bagga Zena . .	361	...	...	...	...	...	...	...	...	...	...
17	Bhadyal Brahmanan .	1,010	...	...	...	...	...	...	...	...	7	21
18	Fatehpur Brahmanan	342	...	...	...	...	...	...	...	...	...	...
19	Sangial . . .	189	...	...	...	...	...	...	...	...	...	6
20	Kotli Arjan Singh .	204	...	...	...	...	...	...	...	...	...	...
21	Bokri . . .	226	...	...	...	...	...	...	...	...	...	...
22	Rattian . . .	323	...	...	2	2	...	...	...	...	...	...
23	Chak Bakhtawan .	233	...	...	...	...	...	...	...	...	...	...
24	Chak Muhammad Yar .	409	...	...	...	...	...	...	...	2	...	5
25	Dopliar . . .	644	...	...	...	...	3	...	...	...	1	...
26	Chak Bala . .	269	...	...	...	...	...	...	...	...	1	...
27	Bhaleear . . .	182	...	...	...	...	...	...	...	...	...	...
28	Magowali . .	930	...	...	...	...	...	...	...	...	...	...

General desiccation only, no other preventive

death-rate fell after the performance of general desiccation ; no other preventive segregation, etc., having been resorted to.

ENDING												
16th February 1902.	22nd February 1902.	1st March 1902.	8th March 1902.	15th March 1902.	22nd March 1902.	29th March 1902.	5th April 1902.	12th April 1902.	19th April 1902.	26th April 1902.	3rd May 1902.	REMARKS.
22	7	3[a]	...	...	...	...	...	...	...	...	...	[a] Desiccated 25th February 1902.
...	...	2[a]	4	1	3	3	2	3	...	...	...	Probably inefficacious desiccation.
8	7	48	33	15	5[b]	...	...	...	...	...	...	*Dogs* and *fowls* died.
...	...	7[a]	...	...	...	...	...	...	...	...	...	[b] Desiccated 20th March 1902.
...	1	9	5	3	1[b]	...	...	...	..	...	...	
...	...	1[a]	...	...	...	...	...	...	...	...	...	
7	4	13[c]	5	2	2	...	...	...	...	...	...	[c] Desiccated 26th February 1902.
1	...	3[c]	...	...	...	...	...	...	...	...	...	
5	7	13[a]	26	31	34	19	5	1	1	...	...	Inefficacious desiccation.
8	1	3[c]	...	...	...	...	...	...	...	...	...	
1	1	2[c]	...	...	...	...	...	...	...	...	...	
17	...	...	4[d]	4	...	...	...	...	...	...	...	[d] Desiccated 5th March 1902.
...	...	15	7[d]	2	...	...	...	...	...	...	...	
...	...	...	5	1[e]	2	1	1	...	...	...	...	[e] Desiccated 11th March 1902.
2	2	8	9[d]	1	1	...	...	...	...	...	...	
...	3	6	9	6[e]	7	3	1	...	...	...	...	
32	15	30	8	2	3[f]	2	2	...	...	...	...	[f] Desiccated 22nd March 1902.
6	17	26	8	2	...[f]	...	...	...	...	...	...	
1	1	4	1	1	...[f]	...	...	...	...	...	...	
...	...	...	3	16	12	4[g]	...	1	...	...	...	[g] Desiccated 25th March 1902.
...	...	8	13	4	4	..[g]	2	...	...	...	...	
...	...	...	...	...	4	1[g]	2	5	2	1	1	
...	...	...	...	...[h]	5	1	1	...	2	1	...	[h] Desiccated 10th March 1902.
11	3	5	...	1[h]	...	1	1	...	...	1	1	
...	1	...	...	1[h]	...	1	1	...	2	...	...	
...	...	...	...	1[h]	...	...	1	...	1	...	1	
...	...	2	4	1[h]	2	...	1	...	...	...	...	
...	2[i]	...[j]	...	...	...	...	...	...	...	...	...	[i] Desiccated 19th, 20th and 21st.
												[j] Desiccated 22nd and 23rd.

measures adopted—J. DUKE.

TABLE II.—*Weekly returns of deaths from plague in 58 villages in which death-rate fell isolation, segregation, etc.,*

Serial No.	NAME OF VILLAGES.	Population.	WEEK									
			7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
29	Kirpind	628	...	...	...	...	...	...	...	...	...	...
30	Jindhar Khurd	339	...	...	...	...	1	...	...	...	...	...
31	Kutah Nizam	279	...	...	...	...	...	6	2	1	...	1
32	Bhow	145	...	..	...	...	...	...	...	...	...	...
33	Mahesian	89	...	...	...	...	...	...	...	...	...	...
34	Dubar No. III	60	...	...	...	...	...	...	...	...	4	...
35	Deoli	432	...	...	...	...	...	...	...	...	...	17
36	Kool No. I	140	...	...	...	...	...	...	...	...	...	4
37	Arnea	2,542	17	37	18	33	26	38[d]	27	14	5[e]	5[f]
38	Kalyana	862	...	...	...	...	...	...	1	3	7	9
39	Khour	615	...	...	...	...	...	...	...	...	...	...
40	Biaspur	248	...	...	...	...	...	...	...	...	...	...
41	Langotian	116	...[g]	...	...	...	...	...	...	...	...	...
42	Hansa	27	...	...	...	...	...	...	...	...	...	...
43	Pindi Sarochan	333	...	...	...	1	2	1	...	...	...	...
44	Barli	85	...	...	...	...	...	...	...	...	...	...
45	Talia	175	...	...	...	...	...	...	...	...	...	...
46	Jassori	113	..	...	...	...	...	...	...	...	...	...
47	Diwangarh	129	...	...	...	...	...	...	...	...	...	...
48	Jujowal	168	...	...	...	...	...	...	...	...	3	1
49	Rugal	255	1[l]	...	...	...	...	...	...	...	...	..
50	Punj Grayan Brahmanan	196	2	4[m]	4	26	6	2	1	...	...	...
	Tehsil Jasmergarh.—											
1	Mangoo Chak	277	4	5[n]	2	2	...	...	...	...	...	...
2	Rajpura	736	...	...	1	9	3	3	1	3[o]	3	1
3	Sanora	1,063	...[p]	...	...	...	...	...	...	2	2	...

after the performance of general desiccation; no other preventive measures such as evacuation, having been resorted to—continued.

ENDING												
15th February 1902.	22nd February 1902.	1st March 1902.	8th March 1902.	15th March 1902.	22nd March 1902.	29th March 1902.	6th April 1902.	12th April 1902.	19th April 1902.	26th April 1902.	3rd May 1902.	REMARKS.
...	...	2	5	2	19[a]	13	24	18	1	...	...	[a] Desiccated 17th March 1902.
...	4	3	4	12	5[n]	2	1	...	1	...	...	Cats and dogs died besides rats.
...	2	...	...	...	3[a]	...	...	...	1	...	...	
...	...	2	8	2	1[a]	5	...	...	...	...	...	
...	...	2	2	1	...[a]	...	...	...	...	...	...	
...	...	...	13	4	1[b]	...	...	...	...	...	...	[b] Desiccated 22nd March 1902.
8	8	16	10	5	3[b]	2	1	2	...	...	...	
1	4	11	7	2	2	1[c]	...	...	...	...	...	[c] Desiccated 24th March 1902.
4	1	1	1	1	2	...[c]	...	...	...	...	...	[d] Desiccated on 10th January 1902.
												[e] Desiccated 1st February 1902.
												[f] Desiccated 2nd February 1902.
10	10	4	4	2	...	[e]...[e]	1	...	...	...	...	
...	11	14	37	19	7	6[c]	1	...	...	...	...	
...	...	...	7[g]	7[g]	2[g]	3[c]	1	...	...	...	...	[g] Desiccated.
...	...	...	...	...	...	3[h]	...	...	...	...	...	[h] Desiccated 25th March 1902.
...	...	...	...	...	...	...	3	...[i]	3	...	...	[i] Desiccated 4th April 1902.
...	...	...	16	9	15	3	8[i]	2	...	...	...	
...	...	...	2	4	1	...	3[i]	...	...	...	...	
11	...	...	...	...[j]	...	...	...	...	...	...	...	[j] Desiccated 25th February 1902.
...	...	...	...	...	3	1[k]	6	2	...	...	...	[k] Desiccated 23rd March 1902.
...	...	...	16	2	...	2	...	...[l]	...	...	...	
1	...	...	...	...	3	...	...	...[l]	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[l] Desiccated 5th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[m] Desiccated 9th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[n] Desiccated 10th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[o] Desiccated 22nd January 1902.
6	4	4	6[q]	5	10	7	3	4	1	...	2	[p] Desiccated 5th December 1901.
												[q] Desiccated 6th March 1902.

TABLE II.—*Weekly returns of deaths from plague in 58 villages in which death-rate fell isolation, segregation, etc.,*

Serial No.	NAME OF VILLAGES.	Population.	Week ending 7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
4	Sherpur Bala .	219	...	...	...	7	2	...	...	1	2[a]	1
5	Sherpur Pain . .	142	...	...	...	1	2	...	2	1	...[b]	2
6	Jandi . . .	589	...	...	...	...	...	...	...	...	...	...
7	Pansar . . .	...	...	...	...	3	6	9	...	10	...	...[c]
8	Nandial . . .	108	...	...	...	...	...	...	...	...	1	...[c]

23

after the performance of general desiccation ; no other preventive measures such as evacuation, having been resorted to—concluded.

ENDING												Remarks.
15th February 1902.	22nd February 1902.	1st March 1902.	8th March 1902.	15th March 1902.	22nd March 1902.	29th March 1902.	5th April 1902.	12th April 1902.	19th April 1902.	26th April 1902.	3rd May 1902.	
...	...	1	1	...	...	...	...	...	...	...	...	[a] Desiccated 28th January 1902.
...	...	...	2	...	1	...	...	...	...	...	...	[b] Desiccated 29th January 1902.
3	1	3	2	7[c]	8	11	6[d]	3	1[e]	2	1	[c] Desiccated 13th March 1902. [d] Desiccated 3rd April 1902. [e] Desiccated 17th April 1902.
15	...	...	...	...	...	...	...	...	...	...	...	[f] Desiccated 3rd February 1902.
1	1	1	...	...	...	...	...	...	...	...	...	[g] Desiccated 6th February 1902.

B. R. SAWHNEY,
Chief Medical Officer, Jammu Province.

24

TABLE III.—*Weekly return of deaths from plague in 45 villages in which these villagers escaped human infection entirely, while in the remaining*

Serial No.	Name of Villages.	Population.	Week ending 7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
1	Sathrayan Khurd	76	...	...	...	...	...	...	...	...	...	...
2	Bagga Marh	89	...	...	...	...	...	...	...	...	...	...
3	Haripur	236	1	...	...	...	...	...	...	...	...	...
4	Kotli Glibanan	74	...	6	1	...	...	...	...	...	...	...
5	Purapan	159	...	...	...	...	1	3	2	...	...	...
6	Lungial	129	...	...	...	...	...	...	...	...	...	...
7	Chak Kahna	206	...	...	...	...	...	...	...	1	...	...
8	Mahola	268	...	...	...	...	9	...	...	...	...	..
9	Sande	25	...	...	...	...	...	...	1	...	1	...
10	Varsalpur	...	...	...	...	...	...	...	...	...	...	...
11	Baspur	146	...	...	...	...	...	...	...	...	...	...
12	Thikarian	83	...	...	...	...	...	...	...	...	...	...
13	Tanda II	200	.	...	...	...	...	..	...	...	...	.
14	Fatehpur Salehrian	236	...	...	...	...	...	...	...	...	...	...
15	Khar Khola	75	...	...	...	...	...	..	...	...	...	...
16	Jassori II	113	...	...	...	...	...	...	.	...	...	..
17	Kotli Brahmanan	229	...	...	...	...	...	...	.	...	...	..
18	Blah	281	3	..	..	...	...	...	..	..	...	..
19	Seer	207	...	...	...	...	...	...	...	...	...	..
20	Makhdoom	138	...	...	...	...	...	...	...	...	..	..
21	Chak Musa	199	...	...	...	...	...	...	...	...	...	...
22	Chak Dhulani	89	...	...	...	...	...	...	...	...	...	...
23	Dabar I	100	...	...	...	...	...	...	...	...	...	...
24	Krel	356	...	...	...	...	...	...	...	...	...	...
25	Rehal	618	5	8	1	...	...	...	...	...	...	..
26	Gundli	373	...	...	...	...	...	...	...	...	...	...
27	Baina Garh	191	...	..	...	...	...	...	...	...	...	...
28	Ghazia	73	...	...	...	...	...	...	...	...	...	...
29	Chak Allawal	87	...	...	...	...	...	...	...	..	...	...
30	Manna	193	...	...	...	...	...	3	...	...	...	...

Preventive desiccation very

desiccation was carried out on the occurrence of death among rats, etc.; most of the disease appeared in a mild form. Evacuation was not resorted to.

ENDING													
15th February 1902.	22nd February 1902.	1st March 1902.	8th March 1902.	15th March 1902.	22nd March 1902.	29th March 1902.	5th April 1902.	12th April 1902.	19th April 1902.	26th April 1902.	3rd May 1902.	REMARKS.
...	...	...	...	...	...	...	...	...	...	...	...	[a]Desiccated 25th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[b]Desiccated 26th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[c]Desiccated 3rd March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[d]Desiccated 26th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[e]Desiccated 22nd March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[f]Desiccated 25th March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[g]Desiccated 23rd March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[h]Desiccated 10th March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[i]Desiccated 22nd March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[j]Desiccated 24th March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	1	2	1	[k]Desiccated 25th March 1902.
...	...	...	...	...	...	...	...	...	1	...	...	[l]Desiccated 4th April 1902.

successful without evacuation.—J. DUKE.

TABLE III.—*Weekly returns of deaths from plague in 45 villages in which desiccation was human infection entirely, while in the remaining the disease*

Serial No.	NAME OF VILLAGES.	Population.	Week ending 7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
31	Raipur	301	...	...	...	...	...	...	...	...	...	...
	Tehsil Jasmergarh—											
1	Koota Brahmnan	1,052	...	...	...	...	...	...	...	...	...	...
2	Khanpur	278	...	...	...	...	...	...	...	...	...	...
3	Sorti Khurd	130	...	...	...	...	...	...[d]	...	...	...	...[e]
4	Sorti Kalan	162	...	...	...	...	...	...[d]	...	2	2	3
5	Chak Feroze	50	...	...	...[f]	1	4	2	...	...	...	...
6	Marin	574	...	...	...	...	...	...	...	...	...	...
7	Maniari	339	...	...[h]	...	...	...	...	...	...	...	...
8	Kadiala	78	...	...[h]	...	...	...	...	...	...	...	...
9	Londi	524	...	...[i]	...	...	...	...	...	...	1	...
10	Nadhala	214	...	...	...	...	...	...	...	...	1	...[j]
11	Tanda	32	...	...	...	...	...	...	...	...	...	...
12	Dholian, No. I	204	...	...[l]	...	...	...	...	...	...	...	...
13	Dholian, No. II	114	...	...[l]	...	...	...	...	...	...	...	...
14	Chackwal	20	...	...	...	...	...	...	...	...	...	...

27

carried out on the occurrence of death among rats, etc.; most of these villagers escaped appeared in a mild form. Evacuation was not resorted to—concluded.

ENDING

15th February 1902.	22nd February 1902.	1st March 1902.	8th March 1902.	15th March 1902.	22nd March 1902.	29th March 1902.	5th April 1902.	12th April 1902.	19th April 1902.	26th April 1902.	3rd May 1902.	Remarks.
...	...	...	...	...	... [a]	...	2	...	...	...	...	[a] Desiccated 17th March 1902.
... [b]	...	...	...	...	...	...	...	...	...	...	...	[b] Desiccated 13th February 1902.
...	...	...	...	...	...	...	... [c]	...	...	...	...	[c] Desiccated 3rd April 1902.
...	...	..	...	...	...	...	...	...	...	...	...	[d] Desiccated 10th January 1902.
												[e] Desiccated 2nd February 1902.
1	...	...	...	...	...	...	...	...	...	...	...	
...	...	..	...	...	...	...	...	...	...	...	...	[f] Desiccated 21st December 1901.
...	...	...	...	...	...	...	...	...	...	...	9	[g] Desiccated 26th December 1901.
..	...	...	...	...	...	...	...	10	2	3	...	[h] Desiccated 11th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	1	...	1	...	...	...	...	...	...	[i] Desiccated 9th December 1901.
...	...	...	...	6	...	...	...	...	...	...	...	[j] Desiccated 6th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[k] Desiccated 19th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[l] Desiccated 8th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	[m] Desiccated 5th December 1901.

B. R. SAWHNEY,
Chief Medical Officer, Jammu Province.

TABLE IV.—*Weekly return of deaths from plague in 18 villages of which the deaths occurred*

Serial No.	Name of Villages.	Population.	Week ending 7th December 1901.	14th December 1901.	21st December 1901.	28th December 1901.	4th January 1902.	11th January 1902.	18th January 1902.	25th January 1902.	1st February 1902.	8th February 1902.
1	Fatwab	150	...	...	...	...	...	...	...	...	3	2
2	Dabar, No I	50	...	...	...	...	...	...	...	...	...	...
3	Do. No. II	70	...	...	...	...	...	...	...	...	...	5
4	Do. No. III	50	...	...	...	...	...	...	...	...	4	...
5	Rathana	613	...	...	...	...	...	7	9	8	4	13
6	Khajupur	312	...	...	...	...	...	...	5	3	6	3
7	Kathar	303	...	...	...	...	...	...	...	...	1	1
8	Laswara	421	11	1	2	3	9	5	1	4	1	...[h]
9	Pindori Brahmanan	175	7	5	2	...[i]	...	...	...	...	...	...
10	Jhakra	844	...	...	3	6	5	1	1	1	...[j]	...
11	Haripur	236	1	...[k]	...	...	...	...	...	...	...	...
12	Chak Tara	107	...[l]	...	...	...	...	2	2	1	..	...
13	Chak Vaziroo	125	...	...	...	...	...	...	...	...	1	...[m]
14	Morchapur	...	2	...	1	1	...	4	...[n]	...	...	...
15	Narhi	246	...	...	...	1	4	1	1	3	4	5
16	Kotli Glebanan	74	...	6		...[n]	...	...	...	...	...	...
17	Chak Agra	751	4	10	10	5	2	7	...	3	9	3
18	Kone	75	...	...	...	...	...	...	...	...	2	3

1. Evacuation.

inhabitants evacuated; desiccation performed before re-entry; no cases or after re-occupation.

ENDING 15th February 1902.	22nd February 1902.	1st March 1902.	8th March 1902.	15th March 1902.	22nd March 1902.	29th March 1902.	5th April 1902.	12th April 1902.	19th April 1902.	26th April 1902.	3rd May 1902.	Remarks.
1	...	1	...	...	4	...	...[a]	...	...	...	...	[a] Desiccated 30th March 1902.
...	...	...[b]	...	...	...	...	...	...	...	...	...	[b] Desiccated 27th February 1902.
2	6	6[c]	...	...	...	...	...	...	...	...	...	[c] Desiccated 20th February 1902.
...	...	...	13	4	1[d]	...	...	...	...	...	...	[d] Desiccated 22nd March 1902.
4	4	...	...[e]	...	...	...	...	...	...	...	...	[e] Desiccated 5th March 1902.
1	3	...	...[f]	...	...	...	...	...	...	...	...	[f] Desiccated 2nd March 1902.
8	2	...	2	...[g]	...	...	...	...	...	...	...	[g] Desiccated 9th March 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[h] Desiccated 7th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[i] Desiccated 25th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[j] Desiccated 27th January 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[k] Desiccated 10th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[l] Desiccated 4th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	[m] Desiccated 5th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[n] Desiccated 12th January 1902.
2	...	...[o]	...	...	...	...	...	...	...	...	...	[o] Desiccated 24th February 1902.
...	...	...	...	...	...	...	...	...	...	...	...	[p] Desiccated 20th December 1901.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	

2. Desiccation.—J. Duke.

B. R. SAWHNEY,

Chief Medical Officer, Jammu.

No. 3643-I.A., dated Simla, the 23th August 1902.

From—The Deputy Secretary to the Government of India in the Foreign Department,

To—L. W. DANE, Esq., I.C.S., Resident in Kashmir.

I am directed to acknowledge the receipt of your letter No. 4491, dated the 18th June 1902, forwarding a report on the results of desiccation in connection with the outbreak of plague in the Jammu City and Province.

2. The facts brought to notice, though undoubtedly of interest, are scarcely sufficient to establish the conclusion that desiccation was the cause of the abatement of plague in Jammu. An important point in favour of this method of disinfection is, however, that it is well received by the people, and it may prove of great assistance in places where chemical disinfection cannot conveniently be resorted to. The results of desiccation in Jammu are being communicated to Local Governments and Administrations for their information.

3. The Government of India have noted, with pleasure, your appreciation of the services rendered by the Medical Officers who are named in paragraph 6 of your letter. Their efforts in connection with the suppression of the outbreak were carried out under trying conditions, and reflect much credit on them. I am to request that they may be informed accordingly.

G. I. C. P. O.—No. 611 F. D.—2-10-1902.—190.—P. K. B.

READ—

Letter No. 7521, dated the 9th April 1900, from the Plague Commissioner in Mysore, to the Secretary to the Government of Mysore, General and Revenue Departments.

In forwarding herewith copy of my memo containing proposals for the reduction of the Plague establishments in the Bangalore City, together with a copy of letter No. A, dated the 5th instant, and of its enclosure from the President, City Municipality, Bangalore, I have the honor to request that you will be so good as to obtain the early orders of Government to the proposals therein contained, the effect of which will be that a separate Health Officer has to be appointed for the City to work under the orders of the President of the City Municipality and that the marginally noted charges will have to be met out of the Provincial Funds till the finances of the Municipality are improved.

	Cost per mensem.
	Rs.
(1) Pay or allowance to full-time Health Officer	200
(2) Moiety of the cost of disinfection in the City as at present estimated	583
(3) Moiety of the cost of the Epidemic Diseases Hospital ...	450
(4) Police orderlies for the Plague Commissioner's office ...	42
(5) Police orderlies for the Deputy Commissioner and President, City Municipal Commission, Bangalore ...	36
(6) Police establishment to help the Medical Officers in the City in connection with segregation, &c. ...	119
Total ...	1,435

This arrangement will bring in a saving of Rs. 2,696 per mensem to Government in the Plague Department as shown in the accompanying statement.

(2). It will be left to the President either to retain or dispense with the services of the Public Works Department Overseer and the Plague Accountant as the Plague Department is not prepared to meet their salaries.

(Enclosures to the above.)

MEMO.

Proposals of the Plague Commissioner for the re-organization of the Plague Establishments in the Bangalore City.

1. The Chief Plague office will be abolished.

2. The Health office will be re-organized as follows :—

The Civil Surgeon will, for the present, be the Health Officer on a monthly allowance of Rs. 200 pending the appointment of a full-time Health Officer. He will exercise all the powers conferred on, and perform all the duties pertaining to, the present Chief Plague Officer and Health Officer. He will be provided with an office establishment as shown in the margin.

	Rs.
1 Head clerk	... 30
1 Statistical clerk	... 25
1 Mutsaddi	... 15
1 Dafadar	... 9
3 Peons at Rs. 7	... 21
Contingencies of the Health office ...	... 100
	200

3. The Ward offices, and the Ward, Civil and Medical Officers will be abolished. In their place, a number of Registrars and Registration offices will be established.

4. The whole of the Supervision Staff will be abolished.

5. The Disinfection Staff will be revised, as noted below :—

	Rs.
Inspector	... 45
Store-keeper	... 25
Head sangmen, 4 at Rs. 10 each	... 40
Coolies, 16 at Rs. 8 each	... 128
Contingencies	... 100
Disinfectants	... 250
Total	... 588

6. The Plague Hospital and Camp will be maintained as at present under the name of Epidemic Diseases Hospital.

7. Seven Registration offices will be established as particularised below and a Medical Registrar will be appointed in charge of each. The Registrar will usually be of the Hospital Assistant's grade not lower than 2nd class in rank. In the Divisions where Municipal dispensaries exist the medical subordinate in charge will be appointed Registrar on a consolidated monthly allowance of Rs. 20. Dispensaries will be opened in those Divisions where they do not exist at present.

Two Registration offices in No. I Division (including Malleswaram.)

The Hospital Assistant in charge of the Malleswaram dispensary will be one of the Registrars and the dispensary will be one of the Registration offices. The other office will be located in the present No. I Ward office situated near the Race Course.

Registration office in No. II Division will be located in the Old Taluk Cutcherry building where a dispensary will be newly opened.

Registration office in No. III Division will be located in the Arlepet dispensary. The medical subordinate in charge will be the Registrar.

Registration office for Nos. IV and V Divisions will be located in the Nagarthpete dispensary and the medical subordinate in-charge will be the Registrar.

Registration office in No. VI Division will be near Kalaspalyam to which place the Fort dispensary has already been removed and the subordinate in charge will be appointed Registrar.

Registration office for No. VII Division will be opened either in the Basavangudi Extension or Chamrajpet, and a new dispensary opened in connection with it.

8. Under each of the Registrars, a number of Sub-Registrars will be appointed, the number varying according to the extent of the area under each jurisdiction. The sub-registrars will be distributed as follows :—

2	Sub-Registrars—one for each of the two Registration offices		in No. I Division.
2	Ditto	ditto	for No. II Division.
2	Ditto	ditto	for No. III Division
4	Ditto	ditto	for Nos. IV & V Divisions.
2	Ditto	ditto	for No. VI Division.
2	Ditto	ditto	for No. VII Division.
14			

The Sub-Registrars will be paid Rs. 12 each per month.

9. A midwife on Rs. 20, and 2 peons each on Rs. 7, will be appointed for each of the Registration offices.

10. It shall be the duty of the Registrars to receive, under the Epidemic Diseases Regulation, reports of all arrivals to and departures from their Divisions, to see sick cases reported, to control the movements of the people residing within their jurisdiction, to take necessary action in all plague cases, to register and certify all births and deaths, and in short, to exercise all the powers now conferred upon and all the duties pertaining to the Ward, Civil and Medical Officers. The Sub-Registrars shall assist the Registrars in maintaining the several registers prescribed (*vide* forms accompanying) and checking personally the information collected by the peons.

The midwives shall be employed in observing females in gosha families and the peons in collecting information of events in the several Divisions.

11. It shall be the duty of every house owner or head of a family to report under the Epidemic Diseases Regulation at the Registrar's office of the Division he may be residing in, all arrivals at, departures from, sickness, births and deaths that may occur in his house or family.

Note.—Arrivals, departures and births should be reported within 24 hours; sickness and death immediately. A certificate of death must be obtained in every case of death from the Registrar who shall grant it, if necessary, after inspection of the body, with as little delay as possible.

General (Plague), dated 19th April 1900.

12. On the first day of June and December of each year, a half-yearly census of the City shall be taken in the following manner :—

Between the 25th and last day of the month preceding the 1st of June and December, census sheets (*vide* form accompanying) in duplicate shall be distributed to all house holders. These shall be duly filled in, signed by them, and the original shall be delivered to the Registrar, either at his office or in such other manner as may be prescribed on the first day of the half-year to which the census relates; the duplicate copy shall be kept by the house holder and pasted on some conspicuous part of his house (preferably the inside of the main door). The latter copy shall be open to inspection at any time of the day.

13. The Registrar shall maintain in his office correct registers showing particulars of people residing within his jurisdiction. These registers shall be posted every fortnight from the informations given by the house holders and that collected by the Sub-Registrars and peons. He shall also maintain a register of births and deaths and sick cases as per forms accompanying.

14. To assist the Registrars in the work of segregation when necessary, in taking mahazars of property left in infected houses after the removal of the inmates to the Camp and storing the same in a strong-room and taking charge of it and for conducting prosecutions under the Epidemic Diseases Regulations, the following establishments will be appointed.

		Rs.
1 Police Officer	...	45+15
8 Constables on	...	8 each.

The cost of this to be met entirely from Provincial Funds.

15. The Police Staff of 1 sergeant and 26 constables now employed for guarding burial grounds will, it is hoped, be done away with from the 1st April 1900, as promised by the President in his No. 457, dated 3rd December 1899, and watchmen appointed in their stead.

16. Regarding the cost of the proposed establishments, it seems fair that the Municipality should pay, if not the whole, at least a good portion of it. Under head I of the proposition statement, the Municipality will be called upon to pay the entire cost of the office establishments and contingencies amounting to Rs. 200 per mensem, the Government paying the Health Officer's allowance *viz.*, Rs. 200, as a temporary measure.

Under head II the entire cost amounting to Rs. 651 will be paid out of the Municipal Funds, registration of births and deaths being a charge properly debitable to these Funds.

The cost of disinfection amounting to Rs. 588 (head III) will also be met out of Provincial Funds as a temporary measure, any compensation when awarded being paid out of Municipal Funds.

The cost of the Epidemic Diseases Hospital will, as a temporary measure, be met in equal shares from Municipal and Provincial Funds.

The Health office establishment, the Registrars and their establishments and the establishment attached to the Epidemic Diseases Hospital will be borne on the permanent lists while the Disinfection and Camp establishments will be on the temporary list.

CENSUS FORM A.

Particulars of Persons residing in house No. Street
Petta Municipal Division on the 1st day of

Serial No.	Names.	Age.	Sex.	Caste.	Particulars of inoculation.

Abstract.

	Males.	Females.
Remained on the 1st day of		
Arrivals during the		
Births		
Departures		
Deaths		

I hereby certify that the above statement is correct.

Date Signature.

Register of Population residing in Municipal Division No. for the half year ending

Block No.	Petta.	Street.	No. of houses.	Caste.	No. of—			Total.	Arrivals.	Births.		Departures.	Deaths.		
					Men.	Women.	Children.			Male.	Female.		Male.	Female.	Children.

NOTE.—All of 10 years and under 10 to be classed as children.

85

General (Plague), dated 19th April 1900.

Register of Deaths in Municipal Division No. of the Bangalore City.

Serial No.	Date and hour of report.	Name of the deceased.	Age.	Caste.	Sex.	Residence.	Block No.	Hour of attention.	Cause of death.	Whether sickness reported during life or not, and if the former, the date of report.	Registrar's initials.	Remarks.

Register of Sick cases in Municipal Division No. of the Bangalore City.

Serial No.	Date and hour of report.	Name of the patient.	Residence.	Block No.	Date and hour of attention.	Disease.	Whether kept under observation.	Date of discharge if observed.	Result.	Registrar's initials.	Remarks.

Proposition statement showing the present and proposed Plague Establishments in the Bangalore City.

Present.				Proposed.				Difference.		
Particulars.	No.	Rate.	Amount.	Particulars.	No.	Rate.	Amount.	Increase.	Decrease.	Net decrease.
		Rs.	Rs. a. p.			Rs.	Rs. a. p.			
President's office—										
1 Accountant	1	35	35 0 0	I Health Officer (allowance)...	1	200	200 0 0			
Chief Plague Officer and Health Officer (allowance) ...	1	200	200 0 0	Establishment to Health Officer—						
Establishment of Chief Plague office—				Head clerk	1	30	30 0 0			
Head clerk	1	45+15	60 0 0	Statistical clerk	1	25	25 0 0			
Assistant clerk	1	30	30 0 0	Mutsaddi	1	15	15 0 0			
Clerk	1	25	25 0 0	Dafadar	1	9	9 0 0			
Dafadar	1	10	10 0 0	Peons	3	7	21 0 0			
Orderlies	5	8	40 0 0	Contingencies of the Health office including stationery, &c.	...	.....	100 0 0			
Total ...	..	.....	400 0 0	Total ...	...	.....	400 0 0	...	...	...
Health Office—										
Clerk	1	30	30 0 0	II Registration of Births and Deaths and taking of census—						
Orderly	1	7	7 0 0	Registrars' (allowance)	7	20	140 0 0			
Total ...	...	.....	37 0 0	Sub-Registrars	14	12	168 0 0			
Ward Officers—				Midwives	7	20	140 0 0			
Ward Officer, Wards Nos. I and II ...	1	150	150 0 0	Peons	14	7	98 0 0			
Do do III and IV ...	1	195	195 0 0	Contingencies of the Registration offices at Rs. 10 per mensem	...	.....	70 0 0			
Total ...	...	.....	345 0 0	Total ...	...	.....	616 0 0	..	...	...

37

General (Plague), dated 19th April 1900.

| | | |

Proposition statement showing the present and proposed Plague Establishments in the Bangalore City.—*contd.*

Present.				Proposed.				Difference.		
Particulars.	No.	Rate.	Amount.	Particulars.	No.	Rate.	Amount.	Increase.	Decrease.	Net decrease.
		Rs.	Rs. a. p.			Rs.	Rs. a. p.			
Disinfection Staff—				III Disinfection Staff—						
Inspectors	2	30	60 0 0	Inspector	1	45	45 0 0			
Head gangmen	10	10	100 0 0	Store-keeper	1	25	25 0 0			
Coolies	32	8	256 0 0	Head gangmen	4	10	40 0 0			
Clerk	1	15	15 0 0	Coolies	16	8	128 0 0			
Carts with bulls	4	10	40 0 0	Disinfectants	...	.....	250 0 0			
Disinfectants	..	.....	400 0 0	Other contingencies	...	.....	100 0 0			
Other contingencies	...	.....	100 0 0							
Total	...	.....	971 0 0	Total	...	.....	588 0 0	...	383	...
Plague Hospital and Camp—				IV Epidemic Diseases Hospital and Camp—						
Superintendent	1	60+50	110 0 0	Superintendent	1	60+50	110 0 0			
Hospital Assistant	1	25+15	40 0 0	Hospital Assistant	1	25+15	40 0 0			
Establishment	...	.....	96 0 0	Establishment	...	.....	103 0 0			
Midwives	2	15+10	50 0 0	Midwives	2	15+10	50 0 0			
Watchmen	3	7	21 0 0	Watchman	3	7	21 0 0			
Hospital dieting charges	...	.....	200 0 0	Hospital dieting charges	...	.....	175 0 0			
Rations to the poor and helpless	...	.....	400 0 0	Rations to the poor and helpless	...	.....	300 0 0			
Contingencies (including burial charges)	...	.....	100 0 0	Contingencies (including burial charges)	...	.....	100 0 0			
Total	...	.....	1,017 0 0	Total	...	.....	809 0 0	...	118	...
Police Staff—				Police Staff—						
Head constable	1	30	30 0 0	Police Officer	1	40+15	55 0 0			
Sergeants	7	14	98 0 0	Constables	8	8	64 0 0			
Constables	67	9	603 0 0	Plague Commissioner's orderlies	6	7	42 0 0			
Do	6	7	42 0 0	Deputy Commissioner's do	4	9	36 0 0			
Total	...	.....	773 0 0	Total	...	.....	197 0 0	...	576	...
Sanitary Improvement—										
Public Works Department Overseer	1	130	130 0 0						180 Savings.	
Grand Total	...	.....	5,096 0 0	Grand Total	...	.....	2,700 0 0	...	2,696	...

General (Plague), dated 19th April 1900.

Letter No. A, dated the 5th April 1900, from the President, City Municipal Commission, Bangalore, to the Plague Commissioner in Mysore.

I have the honor to state that the memorandum regarding the proposed reorganization of the Plague establishment for the City received with your docket No. 7129, dated the 19th ultimo, was placed before the Board at their meeting held on the 29th ultimo. The financial portion of the proposal was discussed and accepted by the Board and a copy of their Resolution is herewith submitted for information. A report regarding some of the details of the scheme will follow.

Extract from the Proceedings of the City Municipal Commission at the meeting held on the 29th March 1900 :—

* * * *

10. Docket No. 7129, dated 19th March 1900, from the Plague Commissioner, forwarding a Memo containing proposals for the reorganization of the Plague establishments in the City and calling for the opinion of the Board in the matter.

Proposed by Mr. Cameron and seconded by Mr. D. Venkatramaiya that the proposals contained in the Plague Commissioner's Memorandum be accepted generally with the alteration that in the interests of the public and the municipality, a full-time Health Officer instead of an *ex-officio* Health Officer may be appointed for the City to work under the orders of the President. Carried *nem con.*

No. Pg. 1291-3, dated Bangalore, 19th April 1900.

Order thereon—The proposals made in the letter and memo read above, and generally accepted by the Bangalore City Municipal Commission, are approved, the date on which effect will be given to the same being intimated to the Comptroller direct by the Plague Commissioner.

2. The Municipal Commission should, as early as possible, arrange for the appointment, as desired by them, of a full-time Health Officer payable from its own funds. Pending such appointment, the Civil Surgeon will, as proposed, be the Health Officer on an allowance of Rs. 200 a month and in addition to his own duties.

3. The cost of the present establishments is Rs. 5,396 while that of the reduced establishments will be Rs. 2,700, thus showing a saving of Rs. 2,696 a month. Rupees 1,435 out of the said Rs. 2,700 will, as recommended by the Plague Commissioner, be debited to Provincial Funds as a temporary measure till the finances of the Municipal Commission are improved. The Commission should use its best endeavours to find funds as early as practicable to enable it to meet the entire charge.

C. SREENIVASIENGAR,
Secy. to Govt., Gen. & Rev. Depts.

To—The Plague Commissionor in Mysore.
The President of the Bangalore City Municipal Commission.
The Comptroller to the Government of Mysore.

Exd.—H.A.R.

4 D

1899-1900

GOVERNMENT OF MYSORE

GENERAL (PLAGUE)

PROCEEDINGS

Dated 19th April 1900

No. Pg. 1291-3

Approving of the Plague Commissioner's proposals for the reduction of the Plague establishments in the Bangalore City.

SBP—4-5-1900—300

Sawy

130/02

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2 190 41

From

SECY. TO THE GOVT. OF MYSORE,
GEN. & REV. DEPTS.

To

The Senior Surgeon &c.

2

Dated 5/11/02
Despatched
Received
General No. 6944
No. 2442/326
Enclosure No.

Has the honor to forward here-with a copy of the report showing the effects of Desiccation of dwellings and effects on death-rate in the Jammu City & Province by Dr. R. R.Sawhney, Chief Medical Officer, Jammu, and to request that the Senior Surgeon will be so good as to have the ~~said~~ system carefully experimented in Bangalore or Mysore and the result watched and reported to Government .

By Order,

4/11/1902
For Secretary.

Ans.

received with the 1st annexure
Resident's D. 205-8 P dated 27th October 1902

42

3

OFFICE OF THE
Regd. No. 10817
4 - APR. 1903
190
NEW

SENIOR SURGEON'S OFFICE, MYSORE
NO. 9356
DATE 2-4-03
BANGALORE

SECTION Sanit
FROM
FILE No. 13 of 02
SERIAL No. 3 To

Mr dlg 2010
4.4.03

Submitted with reference.

5/4/03

H. D. Ranjundappa Esqr
I. A. & R. L.

Secretary to Govt.
Dated
Genl & Revr Depts
Despatched
Bangalore
Received
General No. B
No.
Enclosure No. 1 file

with a draft
Conveying
Sanction.
The method seems
worth pursuing from
the results of the
expts in Kanya Kumary
What I saw in the
Papers, they seem
to have come to
a different Conclu
sion in the Cantonm
ments.

forwarding a report on the value of the disinfection of houses by means of fire & requesting the favour of authorising the Senior Surgeon & S.G. to sanction such sums as may be required for that purpose

8/4/3

The Dewan
through the
2nd Councillor

11/4

5-45 pm

L.B. 646
11-4-03.

9731
14.4.03.

4.4.03

(11 43

From,

Lt. Col. Percy H. Benson M.B.,I.M.S.

Senior Surgeon and Sanitary Commissioner

with the Government of Mysore, Bangalore.

To,

H. V. Nanjundayya Esqr, M.A.,M.L.

Secretary to the Government of Mysore,

Genl. and Rev. Departments, Bangalore.

Dated 2nd April 1903.

No. C 356

Sir,

I have the honor to forward for the information of the Go-vernment of His Highness the Maharaja of Mysore, a report on the value of the disinfection of houses by means of fire, as a remedy for the prevention & suppression of plague- I may mention that these experiments were carried out at my request and partly under my direction. This method of disinfection was first introduced by Dr. Sawhney of Cashmere, and the results said to have been obtained by him in the suppression of plague at Jammu were so assuring that it was considered worthy of a trial here.

Dr. Sawhney claimed that his method was capable of destroying the plague bacillus not only in dwellings, but also in infected clothing, and that bugs, fleas and other vermin were also killed. Before recommending the introduction of this method of disinfection in all Towns and Villages in the Province it occur-ed to me desirable to put it to a practical test, for which pur-

-pose

purpose I asked Dr. M. Sreenivasa Rao, Government Bacteriologist, to carry out certain experiments (as detailed in his report) to prove if possible whether the application of heat in the form recommended by Dr. Sawhney, possessed the power of destroying the plague bacillus in living cultures or not.

From his first experiments it will be seen that all the bouillon agarcultures which had been exposed in the rooms were eventually found to be sterile, whilst only 50 % of the petri dishes containing infected cowdung and clothing were rendered sterile. This we both attributed to the fact that the heat evolved was not sufficient to sterilise the infected cowdung and earth & rags, and that if arrangements could be made to generate more heat, more satisfactory results might be arrived at.

4 In the second set of experiments 5 rooms were operated on as follows:-

In No 1 room there was a heap of cowdung cakes to every 25 Sq. Yds. of floor area. The temperature registered was 80 C. In this room the following cultures were exposed.

3 Petri dishes (with covers on) containing infected cowdung and earth--------- 2 were rendered sterile
3 Tubes of agarcultures----------all sterile
3 Tubes of bouillon ---------- " "
3 Petri dishes of infected rags---------- " "

45

In No 2 room one heap of cowdung cakes was employed for every 29 Sq. feet of floor area. The temperature of this room was not ascertained, as being an inside room access could not be had to it.

The following cultures were exposed,

2 Petri dishes of infected cowdung------One was not rendered sterile

2 Tubes Agar-Cultures---------- both sterile

2 Tubes Bouillon---"---------- " "

2 Petri dishes of infected rags---------- " "

In No. III room one heap of cowdung cakes was employed for every 29 Sq. feet of floor area. Temperature 65 C.

2 Petri dishes cowdung---------- One not sterile

2 Tubes Agar--Cultures---------- both sterile

2 Tubes-Bouillon "---------- One not sterile

2 Petri dishes infected rags---------- Neither sterile

In No. IV room one heap to every 29 Sq. feet of floor area,

2 Petri dishes cowdung---------- One not sterile

2 Tubes Agar-Cultures---------- all sterile

3 Tubes Bouillon---"---------- " "

2 Petri dishes infected rags---------- both sterile

In No. V room one heap of cowdung cakes to every 33 Sq feet floor area.

1 Petri dish cowdung cake---------- not sterile

1 Tube Agar--Culture---------- sterile

1 Tube Bouillon-Cultus.---------- sterile

1 Petri dish infected rags----------not sterile

5 From the above results it will be seen that in room No. 1, with the exception of one petri dish containing infected cowdung, every thing was rendered sterile. In this room the temperature registered was 80 C, and this I consider due to the fact that one heap of cowdung was used for every 25 Sq feet of floor area.

In No. 2 room the results were equally satisfactory.

In No. 3 room the results were not so satisfactory & this is attributed to the fact that a pane of glass was missing from the window and it is probable that the heat escaped.

In No. 4 room the results obtained were on the whole satisfactory.

In No. 5 room results unsatisfactory, most probably due to the fact that the amount of fire per floor area was insufficient.

6 I enclose a letter received from Assistant Surgeon Mr. P. Palpu D. P. H, Health Officer of the City of Bangalore, in which he records his experience of the efficacy and popularity of this method of disinfection.

The advantages of this method over Chemical disinfection may I think be summed up as follows:-

I. It is extremely popular among all classes.

II. It is more economical and does not require a large and costly staff.

III. It does not require highly trained persons to supervise it.

IV. The material is readily available in all villages.

V. It does not require any prolonged absence from the house on the part of the inmates, as the house can be occupied shortly afterwards.

VI. If properly applied, it possesses the property of destroying the plague bacillus, as proved by practical tests on living cultures.

7 It may possibly be argued that it does not and cannot destroy the plague bacilli which are supposed to exist in the floors of houses, especially those where cowdung is employed, as the heat cannot penetrate into the earth in the same way that perchloride of Mercury would. This objection might be met by applying chemical disinfectants to the floors prior to employing heat.

8 Taking every thing into consideration, I am inclined to believe that in this method of disinfection, we possess not only a very valuable remedy, but one that is easy of application and readily available in all towns & villages in the Province.

I

I have therefore the honor to request that the Government of His Highness the Maharaja will be pleased to empower me to sanction such sums as may be required from time to time for this object. I am of opinion that this method of disinfection should be made compulsory in all infected houses & those houses on either side should also be compulsorily disinfected. ~~adjoining them~~.

Since writing this I have received a further communication from Dr. M. Srinivasa Rao (herewith enclosed) on the value of Dr. Sawhney's Desiccator. He tried it in a room having a superficial area of 44 Sq. feet, in which 3 tubes of Bouillon and Agar cultures of the plague bacillus were kept, & the desiccator became red hot, the temperature registered only 2½ feet from it was only 50 C & after 3 hours none of the cultures were rendered sterile. From this he concludes that the desiccator is of no use whatever for disinfecting purposes- Possibly if two desiccators had been used the results might have been different. My own experience of these desiccators is that, they are very cumbrous, the fuel required for their use is more costly, and not readily available & I question if the same degree of heat can be obtained by them as can be got out of cowdung cakes arranged in the manner as shown above viz. 1.heap to every 25

Sq.

(7)

49

.Sq Feet of floor area which standard should invariably be adopted.

I have the honor to be,

Sir,

Your most obedient servant

R. W. Thomson

Lt.Col.I.M.S

Senior Surgeon and Sanitary Commissioner

Mysore Government.

The Chemical Laboratory

& Bacteriological Institute.

Bangalore, 9th March 1903.

No. 350

Enclosures: Nil

Encl: No 2

From M. Srinivasa Rau Esq M.A., M.D. C.M. & B.Sc (Edin).
The Chemical Examiner and Bacteriologist
to the Government of Mysore &
Lecturer on Biology & Physiology, Central College, Bangalore.

To Lt.Col: P. H. Benson M.B. I.M.S.
Senior Surgeon & Sanitary Commissioner
Bangalore.

Sir,

I have the honour to state that eight houses in Appajiah's Agraharam in Chamrajpett Bangalore, were disinfected by the method of burning heaps of 'bratties (cowdung cakes). One room in each of these houses was chosen for the purpose of.

51

experiment. The areas of the rooms varied from 108 to 300 Square feet. Heaps of 'brattices were so arranged as to have one heap for every 40 Square feet. Each such heap measured on an average 2 feet in dia-meter and was one foot high Containing about 150 'brattices'. Thermo-meters were kept in each room both at the level of the floor and at heights varying from one foot to eight feet. The readings of the thermometers were noted half an hour after the 'brattices' were set on fire and also after

52

they were completely burnt. Those on the floors registered temperatures varying 60° to 75° C and those above the level of the floor 70° to 90° C. Petri dishes containing a dried mixture of cowdung and earth previously sterilised and others containing pieces of sterilised rags both infected with an emulsion of plague bacillus, and agar and bouillon cultures of plague bacillus in test tubes were exposed in the rooms both on the floor and at heights

varying from ½ ft: to 4 ft: 5 in: In the two mud-roofed houses and in the other six tile-roofed houses, Petri dishes and test tubes were taken out at the end of one hour and three quarters of an hour respectively and bouillon cultures were made from them. These were incubated for 48 hours and examined. The results were as follows:— All the bouillon and agar tubes were found sterile. Fifty per cent of the Petri dishes containing a mixture of infected cowdung and earth and rags were not sterile.

54

I am of opinion that the heat evolved was not sufficient to sterilise the infected Cowdung and earth mixture and rags and that if arrangements are made to generate more heat, a more satisfactory result may be arrived at.

I have the honour to be
Sir,
Your most obedt Servant

55

The Chemical Laboratory
& Bacteriological Institute.

Dgno: 3905
30.3.03.

Bungalore, 16th March 1903.

No. 356

Enclosures:

Copied

From

M. Srinivasaraw Esqre M.A. M.D. C.M. B.Sc.
The Chemical Examiner and Bacteriologist (Edin.)
to the Government of Mysore, &
Lecturer on Biology & Physiology, Central College, Bangalore.

To

Lt Col P. H. Bewson M.B., B.Sc.,
Senior Surgeon & Sanitary Commissioner
Bangalore

Sir,

In continuation of my letter No 350 dated 4th March 1903, I have the honour to state that further experiments were made in a house in Chamarajpet, Bangalore City. A plan of the house is shown in the margin.

rooms in it is enclosed. In room
№ I, nine heaps of bricks were
counted in each the above are-
ranged so as to have one heap
for every 25 sq. are feet. In
rooms №s II and III, there were
four heaps running one for every
21 sq. are feet. In the fourth
room there was a similar ar-
rangement but with the heaps
in № V there were 2 heaps,
one for every 33 sq. are feet.

impracticable to ...

if kept in other room ...

meter in room No I ... glove ...

80° F ... in room with ... hour

after the ... then ... on

: ... the thermometer in room No ...

Shaw ... in 65° F

... 10

mixture and ... agar and bouillon

Culture ... of ... plate ... bacillus ...

were exposed ... the ... room ...

... bouillon ... thermometer ...

from ... to ...

IV ...

heaps of bacteria resembling,

the colonies more or less of a

[illegible] to those of the

brain and spinal cultures. A

[illegible] found after the Pfeiffer

[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [

[illegible] Ptisdesh [illegible] in [illegible] d
[illegible] [illegible] [illegible] with [illegible] d [illegible] mark.
[illegible] th [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
from the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
that the h [illegible] [illegible] [illegible] more [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] all the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
disinfected if they [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]

$7_1\ 9_1\ H_1\ Z_1\ m_1\ Q_1\ R_1\ k_1\ W_1\ Y_1$ = Petri dishes containing sterilized mixture of cowdung & earth infected with Plague Bacillus

$7_2\ 9_2\ H_2\ Z_2\ m_2\ Q_2\ R_2\ k_2\ W_2\ Y_2$ = Agar cultures of Plague Bacillus

$7_3\ 9_3\ H_3\ Z_3\ m_3\ R_3\ k_3\ W_3\ Y_3$ = Bouillon cultures of Plague Bacillus

$9.\ K_1\ N.\ O.\ P.\ S.\ T.\ V\ X\ Z$ = Petri dishes containing pieces of rags sterilized & infected with Plague Bacillus.

Thermometers 1 & 2 were kept in rooms I & III respectively on the floor. The latter were at first 10 cm. Thermometers 1 in rooms I & II respectively 80°C
" 2 " " " " 65°C.
All the Agar tubes in rooms I & IV were kept inclined.

Dgrs: 3887 of 27.3.13

The Chemical Laboratory 11

& Bacteriological Institute.

Bangalore, 26th March 1903.

No. 368

Enclosures:—

From

Dr M. Srinivasaraw
The Chemical Examiner and Bacteriologist
to the Government of Mysore,
Bangalore.

To

Lt: Col: P. H. Benson M.B. I.M.S
Senior Surgeon & Sanitary Commr
Bangalore.

Sir,

I have the honour to state that the desiccator was used in a room measuring 44 Square feet in a house in Chamarajpet Agraharam, Bangalore City. The desiccator was first filled with pieces of Coal and battics to the depth of about an inch and with the aid of Kerosine oil was set on fire. Ten minutes

afterwards, the 62 desiccator was filled to the top with coal and an hour ~~thereafter~~, the lid was put on. Plenty of smoke was given off through the flues for a hour and a half and the desiccator became red hot three hours after the coal was set on fire. Three bouillon and 9 agar cultures of the plague bacillus were kept in different parts of the room at the commencement of the experiment. Two thermometers which were kept at about 2 1/2 feet from the desiccator registered only 50° C at the end of 3 hours. Cultures were made from the exposed tubes and incubated for 48 hours and on examination

it was found that none of the tubes exposed had been rendered sterile. I am, therefore, of opinion that the desiccator is of no use whatever for disinfecting purposes.

I have the honourable
Sir
Your most obedient Servant

Chemical Examiner & Bacteriologist
to the Government of Mysore.

64

Health Office,

Bangalore City 28th January 1903.

No.1368

Encls

From

P. Palpu Esquire L.M.S., D.P.H.,

Health Officer, Bangalore City.

To

Lt. Colonel.P.H.Benson M.B., I.M.S.,

Senior Surgeon and Sanitary Commissione

with the Government of Mysore

Bangalore.

Sir,

With reference to your No.59-60/P dated 6th November 1902 calling for report on the result of disinfection by desiccation, I have the honor to state that since the 6th of December, when the new method was commenced to be given a trial 20 houses and 2 Chuttrams were disinfected by heat and that in none of these houses has there been any fresh case reported although out of 735 houses disinfected in the usual way with Perchloride of Mercury lotion during the same period, the disease recurred in 9 instances. In one of the Chuttrams referred to, the inner rooms were disinfected by heat while the outer ones were done with lotion. The disease recurred in one of the outer rooms while among the families occupying rooms in the interior, no fresh cases occured. This speaks well of the new method but till further statistics are available it may be premature to give any definite opinion. The method however has many advantages. In the first place it is popular. People do not feel any great inconvenience, as they need not find temporary accommodation for themselves and are not put to the trouble of having to move out their "Saman" and re-arrange them afterwards. These are left in the rooms during disinfection. It does not also want a large staff in arranging the bratties and setting fire to them. When bratties are properly arranged the temperature can easily be raised to the point required. The heat pervades every part of the room and there is very little chance of infected material, if any in nooks and corners being left as they are as they occasionally happen

happen in disinfection with chemicals . In addition to destroying disease germs, the heat kills also fleas, bugs and other vermin which in many of our houses are a constant source of annoyance. Cockroaches lizards &ca drop down dead during the process while rats either die in their holes or run away if that be possible. The smoke generated is also an advantage, for, it blackens the walls and ceiling so much as to necssitate subsequent whitewash -ing which is a useful adjunct.

Another advantage of disinfection by heat is that it destroys or drys up the organic matter with which the walls and floor of most of our houses.are usually saturated, and which probably forms a favorable medium for the growth of germs and thus prevents their further development at least for a time.

The cost of the method is not much.The 20 hoses and two Chuttrams have cost only Rs.1-8-0.each on an average, and it is believed that when more houses are done the cost would go down still further. As bratties are easily procurable and are availble in most houses, people occasionally supply them themselves free of cost. In villages, I am informed any amount of these can be had for the mere asking and that when the new method is explained to them, the villagers readily supply the bratties, arrange them themselves & have all the hoses disinfected at the same time, if that be required and that most willingly.

I have&ca.

Sd/ P. Palpu

Health Officer.

No. 547
Pg

66

In forwarding this letter to the Senior Surgeon I would strongly recommend the adoption of this method of disinfection by heat. I have demonstrated this method to many towns and villages in the District and in every single instance the people have declared themselves readily to adopt it and help with the aid of bratties &c if some one is present to show them what to do. Col. Foreman who witnessed an experimental case in the fort one morning appeared to be strongly in favour of it. If anything is going to be done, now is the time to do it as just at present the plague appears to be at its worst in the District and the towns and villages are evacuated and they should be disinfected before the people are allowed to return. I would recommend beginning being made with the Bangalore City after which the trained staff will be available for the towns and villages.

Sd/ H.H.Sparkes.

29 / 1 / 03.

SECTION Sanvy 4

FILE No. 130/02

SERIAL No. 4

Read again:-

This office docket No6914-L. B.P.326 dated the 5th November 1902 to the address of the Senior Surgeon and Sanitary Commissioner with the Government of Mysore, forwarding copy of a report by Dr.B.R.Sawhney, Chief Medical Officer, Jammu, shewing the effects of desiccation of dwellings and effects in the Jammu City and Province with a request that the system referred to therein may be carefully experimented in Bangalore and Mysore and the result watched and reported.

Also-

Letter No G.356 dated the ~~4th~~ 1st April 1903 from the ~~same~~ officer, forwarding a detailed report, ~~as called for above~~, on the value of disinfection of houses &c by fire as a remedy for the prevention and spread of plague and stating that taken all in all, he is inclined to think that in this mode of disinfection government possessed not only a very valuable remedy but one that is easy of application and readily available in all towns and villages in the Stateand therefore requesting that he may be empowered to sanction such sums as may be necessary from time to time for the purpose.

Please submit this to the Devan under whose orders and without reference to me, this report was called for - I cannot know why report not called for by me shewed when received he sent it to me - All this literature re rats &c &c accompanying me tho it is a letter dated 13/4/03 - cannot be a letter under me May I lay the Devan to give instructions in the matter to Sir Patrick Hehir.

4/1914

(In extenso).

1286

It is surely an omission that the original letter with me was not shown to the II Commissioner which might have been avoided

15.IV.03

Order thereon No. 15251-2. / 18741. 22/4/03

Government have read with interest the report of the Senior Surgeon and though nothing definite can be said, at this stage, on the utility or otherwise of disinfection of infected houses by desiccation generally, yet the results of the experiments already made justify its continuance for a further period, say 6 months. ~~Govt. to continue them further~~; the Senior Surgeon is accordingly authorized to incur such small expenditure as may be necessary in the initial stage and within his powers of sanction and include the same in the probable monthly statement of expenditure. The Senior Surgeon will give such instructions as may be necessary to supplement the desiccation with the chemical disinfectant & the floor in cases where such a course may be deemed advisable or necessary

2 Government hope that detailed statistics will be maintained in every case and be available as to the number of houses so disinfected with particulars shewing the number of them wherein there have not been fresh cases since such disinfection.

3. It is desirable that the cleaning of bazaars and streets should be completed by disinfection in the manner above mentioned and the Senior Surgeon is requested to take necessary action

(May this be printed) Secretary.

To W[illegible] 11/4/03 Govt
The Senior Surgeon. 10/4/03.
" Comptroller.

Issue as above
21/4

Subd to 2nd Committee 15.IV.03
18/4/03

17/4/03 L.S.678.
19-4-03 18-4-03.

READ AGAIN—

This office docket No. 6914—L. B. P. 326, dated the 5th November 1902, to the address of the Senior Surgeon and Sanitary Commissioner with the Government of Mysore, forwarding copy of a report by Dr. B. R. Sawhney, Chief Medical Officer, Jammu, showing the effects of desiccation of dwellings and effects in the Jammu City and Province, with a request that the system referred to therein may be carefully experimented in Bangalore and Mysore and the result watched and reported.

ALSO—

Letter No. G. 356, dated the 2nd April 1903, from the said officer.

1. I have the honor to forward for the information of the Government of His Highness the Maharaja of Mysore, a report on the value of the disinfection of houses by means of fire, as a remedy for the prevention and suppression of plague. I may mention that these experiments were carried out at my request and partly under my direction. This method of disinfection was first introduced by Dr. Sawhney of Cashmere, and the results said to have been obtained by him in the suppression of plague at Jammu were so assuring that it was considered worthy of a trial here.

2. Dr. Sawhney claimed that his method was capable of destroying the plague bacillus not only in dwellings, but also in infected clothing, and that bugs, fleas and other vermin were also killed. Before recommending the introduction of this method of disinfection in all towns and villages in the Province, it occurred to me desirable to put it to a practical test, for which purpose I asked Dr. M. Srinivasa Rao, Government Bacteriologist, to carry out certain experiments (as detailed in his report) to prove, if possible, whether the application of heat in the form recommended by Dr. Sawhney, possessed the power of destroying the plague bacillus in living cultures or not.

3. From his first experiments, it will be seen that all the bouillon agar cultures which had been exposed in the rooms were eventually found to be sterile, whilst only 50 per cent of the petri dishes containing infected cowdung and clothing were rendered sterile. This we both attributed to the fact that the heat evolved was not sufficient to sterilise the infected cowdung and earth and rags, and that if arrangements could be made to generate more heat, more satisfactory results might be arrived at.

4. In the second set of experiments five rooms were operated on as follows :—

In No. I room there was a heap of cowdung cakes to every 25 square feet of floor area. The temperature registered was 80° C. In this room the following cultures were exposed :—

Three petri dishes (with covers on) containing infected cowdung and earth	...	...	Two were rendered sterile.
Three tubes of agar cultures	...	...	All sterile.
Three tubes of bouillon	...	...	All sterile.
Three petri dishes of infected rags	..	...	All sterile.

In No. II room one heap of cowdung cakes was employed for every 29 square feet of floor area. The temperature of this room was not ascertained, as, being an inside room, access could not be had to it.

The following cultures were exposed :—

Two petri dishes of infected cowdung	...	...	One was not rendered sterile.
Two tubes agar cultures	...	...	Both sterile.
Two tubes bouillon ...	...	...	Both sterile.
Two petri dishes of infected rags	...	...	Both sterile.

In No. III room one heap of cowdung cakes was employed for every 29 square feet of floor area. Temperature 65°C. :—

Two petri dishes cowdung ...	...	...	One not sterile.
Two tubes agar cultures ...	...	...	Both sterile.
Two tubes bouillon ...	...	...	One not sterile.
Two petri dishes of infected rags	...	...	Neither sterile.

In No. IV room one heap to every 29 square feet of floor area :—

Two petri dishes cowdung ...	...	...	One not sterile.
Two tubes agar cultures ...	...	...	Both sterile.
Three tubes bouillon ...	...	...	All sterile.
Two petri dishes infected rags	...	...	Both sterile.

In No. V room one heap of cowdung cakes to every 33 square feet of floor area :—

One petri dish cowdung cake	...	...	Not sterile.
One tube agar cultures	...	...	Sterile.
One tube bouillon cultures	...	...	Sterile.
One petri dish infected rags	...	...	Not sterile.

5. From the above results it will be seen that in room No. I, with the exception of one petri dish containing infected cowdung, everything was rendered sterile. In this room the temperature registered was 80°C., and this I consider due to the fact that one heap of cowdung was used for every 25 square feet of floor area.

In No. II room the results were equally satisfactory.

In No. III room the results were not so satisfactory, and this is attributed to the fact that a pane of glass was missing from the window and it is probable that the heat escaped.

In No. IV room the results obtained were on the whole satisfactory.

In No. V room results unsatisfactory, most probably due to the fact that the amount of fire per floor area was insufficient.

6. I enclose a letter received from Assistant Surgeon Mr. P. Palpu, D. P. H., Health Officer of the City of Bangalore, in which he records his experience of the efficacy and popularity of this method of disinfection.

The advantages of this method over chemical disinfection may, I think, be summed up as follows :—

(1) It is extremely popular among all classes.

(2) It is more economical and does not require a large and costly staff.

(3) It does not require highly trained persons to supervise it.

(4) The material is readily available in all villages.

(5) It does not require any prolonged absence from the house on the part of the inmates, as the house can be occupied shortly afterwards.

(6) If properly applied, it possesses the property of destroying the plague bacillus, as proved by practical tests on living cultures.

7. It may possibly be argued that it does not and cannot destroy the plague bacilli which are supposed to exist in the floors of houses, especially those where cowdung is employed, as the heat cannot penetrate into the earth in the same way that perchloride of mercurry would. This objection might be met by applying chemical disinfectants to the floors prior to employing heat.

8. Taking everything into consideration, I am inclined to believe that in this method of disinfection, we possess not only a very valuable remedy, but one that is easy of application and readily available in all towns and villages in the Province. I have therefore the honor to request that the Government of His Highness the Maharaja will be pleased to empower me to sanction such sums as may be required from time to time for this object. I am of opinion that this method of disinfection should be made compulsory in all infected houses and those houses on either side should also be compulsorily disinfected.

9. Since writing this, I have received a further communication from Dr. M. Srinivasa Rao (herewith enclosed) on the value of Dr. Sawhney's Desiccator. He tried it in a room having a superficial area of 44 square feet, in which three tubes of bouillon and agar cultures of the plague bacillus were kept and the desiccator became red hot, the temperature registered only 2½ feet from it was only 50° C. and after three hours none of the cultures were rendered sterile. From this he concludes that the desiccator is of no use whatever for disinfecting purposes. Possibly if two desiccators had been used the results might have been different. My own experience of these desiccators is that, they are very cumbrous, the fuel required for their use is more costly, and not readily available. I question if the same degree of heat can be obtained by them as can be got out of cowdung cakes arranged in the manner as shown above, *viz.*, one heap to every 25 square feet of floor area, which standard should invariably be adopted.

(ENCLOSURES TO THE ABOVE.)

(a) Endorsement No. 547—Pg., dated the 29th January 1903, from Mr. H. H. Sparkes, Deputy Commissioner, Bangalore District, forwarding letter No. 1368, dated the 23th January 1903, from Mr. P. Palpu, L.M. & S., D.P.H., Health Officer, Bangalore City, to the address of Lieutenant-Colonel P. H. Benson, M.B., I.M.S., Senior Surgeon and Sanitary Commissioner with the Government of Mysore.

In forwarding this letter to the Senior Surgeon I would strongly recommend the adoption of this method of disinfection by heat. I have demonstrated this method to many towns and villages in the district, and in every single instance the people have declared themselves readily to adopt it and help with the aid of bratties, etc., if some one is present to show them what to do. Colonel Foreman, who witnessed an experimental case in the Fort one morning, appeared to be strongly in favor of it. If anything is going to be done, now is the time to do it, as just at present the plague appears to be at its worst in the district and the towns and villages are evacuated and they should be disinfected before the people are allowed to return. I would recommend beginning being made with the Bangalore City, after which the trained staff will be available for the towns and villages.

Local Boards Branch, Plague, dated 22nd April 1903.

Letter No. 1368, dated the 28th January 1903, from Mr. P. Palpu, L. M. & S., D. P. H.; Health Officer, Bangalore City, to Lt.-Col. P. H. Benson, M. B., I. M. S., Senior Surgeon and Sanitary Commissioner with the Government of Mysore.

With reference to your No. 59-60—P., dated the 6th November 1902, calling for a report on the result of disinfection by desiccation, I have the honor to state that since the 6th of December, when the new method was commenced to be given a trial, 20 houses and two chattrams were disinfected by heat, and that in none of these houses has there been any fresh case reported although out of 735 houses disinfected in the usual way with perchloride of mercury lotion during the same period, the disease recurred in nine instances. In one of the chattrams referred to, the inner rooms were disinfected by heat while the outer ones were done with lotion. The disease recurred in one of the outer rooms, while among the families occupying rooms in the interior, no fresh cases occurred. This speaks well of the new method; but till further statistics are available, it may be premature to give any definite opinion. The method, however, has many advantages. In the first place it is popular. People do not feel any great inconvenience, as they need not find temporary accommodation for themselves and are not put to the trouble of having to move out their "saman" and re-arrange them afterwards. These are left in the rooms during disinfection. It does not also want a large staff in arranging the bratties and setting fire to them. When bratties are properly arranged, the temperature can easily be raised to the point required. The heat pervades every part of the room and there is very little chance of infected material, if any, in nooks and corners, being left as they are, as they occasionally happen in disinfection with chemicals. In addition to destroying disease germs, the heat kills also fleas, bugs and other vermin which in many of our houses are a constant source of annoyance. Cockroaches, lizards, etc., drop down dead during the process, while rats either die in their holes or run away if that be possible. The smoke generated is also an advantage, for, it blacknes the walls and ceiling so much as to necessitate subsequent whitewashing, which is a useful adjunct. Another advantage of disinfection by heat is that it destroys or dries up the organic matter with which the walls and floor of most of our houses are usually saturated, and which probably forms a favorable medium for the growth of germs, and thus prevents their further development, at least, for a time.

The cost of the method is not much. The 20 houses and two chattrams have cost only Rs. 1-8-0 each on an average, and it is believed that when more houses are done, the cost would go down still further. As bratties are easily procurable and are available in most houses, people occasionally supply them themselves free of cost. In villages, I am informed any amount of these can be had for the mere asking and that when the new method is explained to them, the villagers readily supply the bratties, arrange them themselves and have all the houses disinfected at the same time, if that be required, and that most willingly.

(b) Letter No. 350, dated the 9th March 1903, from Dr. M. Sreenivasa Rao, M.A., M.D., C.M. and B. Sc. (Edin.), Chemical Examiner and Bacteriologist to the Government of Mysore.

I have the honor to state that eight houses in Appajaiya's Agraharam in Chamrajpet, Bangalore, were disinfected by the method of burning heaps of bratties (cowdung cakes). One room in each of these houses was chosen for the purpose of experiment. The areas of the rooms varied from 108 to 300 square feet. Heaps of "bratties" were so arranged as to have one heap for every 40 square feet. Each such heap measured on an average 2 feet in diameter, and was one foot high containing about 150 "bratties." Thermometers were kept in each room both at the level of the floor and at heights varying from one foot to eight feet. The readings of the thermometers were noted half an hour after the "bratties" were set on fire and also after they were completely burnt. Those on the floor registered temperatures varying 60° to 75°C. and those above the level of the floor 70° to 90°C. Petri dishes containing a dried mixture of cowdung and earth previously sterilised and others containing pieces of sterilised rags both infected with an emulsion of plague bacillus, and agar and bouillon cultures of plague bacillus in test tubes were exposed in the rooms both on the floor and at heights varying from ½ foot to 4 feet 5 inches. In the two mud-roofed houses and in the other six tile-roofed houses, petri dishes and test tubes were taken out at the end of one hour and three-quarters of an hour, respectively; and bouillon cultures were made from them. These were incubated for 48 hours and examined. The results were as follows:—

All the bouillon and agar tubes were found sterile. Fifty per cent of the petri dishes containing a mixture of infected cowdung and earth and rags were not sterile.

I am of opinion that the heat evolved was not sufficient to sterilise the infected cowdung and earth mixture and rags, and that if arrangements are made to generate more heat, a more satisfactory result may be arrived at.

(c) Letter No. 356, dated the 16th March 1903, from the same officer.

In continuation of my letter No. 350, dated 9th March 1903, I have the honor to state that further experiments were made in a house (of five rooms) in Chamrajpet, Bangalore City.

* * * * *

In room No. I nine heaps of "bratties" containing 60 in each heap, were arranged so as to have one heap for every 25 square feet. In rooms Nos. II and III there were four heaps having one for every 29 square feet. In the IVth room, there was a similar arrangement but with 7 heaps. In room No. V there were two heaps, one for every 33 square feet. Thermometers were placed only in rooms Nos. I and III, it being impracticable to take their reading if kept in other rooms. The thermometer in room No. I registered 80°C. three-quarters of an hour after the "bratties" were set on fire, while that in room No. III showed only 65°C. Infected rags and cowdung and earth mixture and agar and bouillon cultures of plague bacillus were exposed in the rooms and bouillon cultures were made from these as before. In rooms Nos. I and IV which contained 9 and 7 heaps of bratties respectively, the results were more satisfactory than in others. In these, all the bouillon and agar cultures and rags were found sterile. One petri dish in each, containing infected cowdung and earth, was not rendered sterile. In room No. II, only one petri dish containing infected cowdung and earth was not sterile. In room No. III, one bouillon culture, two petri dishes with infected rags and one with infected cowdung and earth remained unsterilised. In room No. V one petri dish containing infected cowdung and earth and another with rags remained unsterilised. From these results, I consider that the heat was more evenly distributed in rooms Nos. I and IV in which all the agar tubes were melted. Houses will, I think, be efficiently disinfected if the heaps of "bratties" containing 60 in each are so arranged as to have one heap for every 25 square feet of a room.

(*d*) *Letter No. 368, dated the 26th March 1903, from the same officer.*

I have the honor to state that the desiccator was used in a room measuring 44 square feet in a house in Chamrajpet Agraharam, Bangalore City. The desiccator was first filled with pieces of coal and "bratties" to the depth of about an inch and with the aid of kerosine oil was set on fire. Ten minutes afterwards, the desiccator was filled to the top with coal and an hour after, the lid was put on. Plenty of smoke was given off through the flues for an hour and a half and the desiccator became red hot three hours after the coal was set on fire. Three bouillon and nine agar cultures of the plague bacillus were kept in different parts of the room at the commencement of the experiment. Two thermometers which were kept at about 2½ feet from the desiccator registered only 50°C. at the end of three hours. Cultures were made from the exposed tubes and incubated for 48 hours, and on examination it was found that none of the tubes exposed had been rendered sterile. I am therefore of opinion that the desiccator is of no use whatever for disinfecting purposes.

No. 15251-2—L. B. P. 741, DATED BANGALORE, THE 22ND APRIL 1903.

ORDER THEREON.—Government have read with interest the report of the Senior Surgeon, and though nothing definite can be said, at this stage, on the utility or otherwise of disinfection of infected houses by desiccation generally, yet the results of the experiments already made justify its continuance for a further period, say six months. The Senior Surgeon is accordingly authorized to incur such small expenditure as may be necessary in the initial stage and within his powers of sanction and include the same in the probable monthly statement of expenditure. The Senior Surgeon will give such instructions as may be necessary to supplement this desiccation with the chemical disinfection of the floor in cases where such a course may be deemed advisable or necessary.

2. Government hope that detailed statistics will be maintained in every case and be available as to the number of houses so disinfected with particulars showing the number of them wherein there have not been fresh cases since such disinfection.

3. It is desirable that the Cities of Mysore and Bangalore should be completely disinfected in the manner above mentioned, and the Senior Surgeon is requested to take early action.

H. V. NANJUNDAYYA,
Secy. to Govt., Gen. & Rev. Depts.

To—The Senior Surgeon and Sanitary Commissioner with the Government of Mysore.
The Comptroller to the Government of Mysore.

Exd.—C.V.

73

1902-03

GOVERNMENT OF MYSORE

L. B. B.—(PLAGUE)

PROCEEDINGS

Dated 22nd April 1903

No. 15251-2 / L. B. P. 741

Passing orders on the report of the Senior Surgeon on disinfection by desiccation, and directing that such mode of disinfection be further tried in the Cities of Bangalore and Mysore.

SBP—27-4-03—200